2016 Nunavut Research Licence Renewal Application: Wayne Pollard

Project Title: An investigation of the sensitivity of high Arctic permafrost to climate change

Principal investigator: Dr. Wayne Pollard, Professor, Department of Geography, McGill University, 805 Sherbrooke St. W. Montreal, Quebec. H3A 0B9

2016 Research Team: Wayne Pollard (PI), Chris Omelon, Dale Andersen, Denis Lacelle, Michael Templeton (M.Sc.), Melissa Ward (Ph.D.) and an undergraduate field assistant from McGill – This is a university-based research project.

2016 Fieldwork Schedule: Planned fieldwork July 15- August 30.

2016 Field sites: The Eureka area on the Fosheim Peninsula, Ellesmere Island (80º00'N 85º95'W), and Expedition Fiord area, Axel Heiberg Island (79º25'N; 90º45'W). We will be based most of the time at the Eureka Weather Station.

Funding source: Discovery Grant from the Natural Science and Engineering Research Council (NSERC). Logistical support is provided by the Polar Continental Shelf Program

Project Overview:
This is an ongoing project that examines how global warming, in particular warm summer temperatures, is affecting the stability of high Arctic permafrost conditions, landscapes and infrastructure. There are 4 main aims: (1) to identify and measure changes in different landscapes (e.g. tundra, polar desert, wet lands, shorelines), (2) to assess local climate variability, (3) to evaluate the nature and extent of ground ice in permafrost and its vulnerability to climate change, (4) to determine the amount and rate of landscape change caused by warming and melting permafrost (thermokarst). A secondary aim is to assess the degree to which these changes impact fuel contaminated soils. The significance on this project is reflected in the dramatic increase in melting permafrost observed in 2011 and 2012. The information collected in this study will improve our general understanding of how climate and permafrost interact which will allow for the better prediction of future changes. This research also has a significant training component involving students on several levels.

Progress Report – 2015 Scientific Research Licence #02 020 15R-M (multiyear)
In 2015 fieldwork focussed on sites in the Eureka Sound lowlands on Ellesmere Island and Expedition fiord Axel Heiberg Island. My students and I based our work from the Eureka weather station for a period 15 days (July 1 – July 15) during which we repeated on going measurements of thaw slump retreat and ice wedge subsidence around the Environment Canada weather station, runway and DND base. Fieldwork planned for the at Expedition Fiord area of Axel Heiberg Island had to be cancelled due to limited logistical support. At Eureka our activities included detailed geomorphic, dGPS, GPR and vegetation surveys in areas of natural thermokarst. Ice and soil samples were collected to determine carbon and ice content and ground ice origin. Total Soil Carbon contents in the active layer are extremely low < 1% in most areas, but slightly higher in (2-3%) in wetlands. The pattern of thawing permafrost was similar to 2013 & 2014 and is much lower than seen in 2011 & 2012. The Eureka area contains extensive massive ground ice deposits (massive ground ice refers to thick (3-10m) layers of nearly pure ice) beneath 1-4 m of marine sediments. The presence of massive ice makes this area extremely vulnerable to thaw subsidence and erosion. My work in the Eureka Sound Lowlands over the past 2 decades has identified at least 10 ground ice

hotspots where ground ice represents a significant part of the near surface permafrost although since 2011 we have noticed thermokarst activity and ground ice everywhere below 150 M asl.. In 2012 we reported an unprecedented level of thermokarst (250+ retrogressive thaw slumps) but in 2015 the pattern was greatly reduced. PhD student M. Becker has completed his research on the impact of thawing ice wedges and found that ice wege thaw drives a stabilizing change in vegetation. The monitoring or retrogressive thaw slump retreat is part of new PhD research by M. Ward. In addition to field mapping areas of thermokarst Ward is using satellite imagery to map and monitor landscape scale changes. July fieldwork included ground penetrating radar surveys of ice wedges and massive ice deposits, sampling of ground ice and aerial surveys.

2016 Field Program.

The aim of my 2016 field program is to continue my investigations on how climate change will affect ice-rich permafrost and in particular rates of thermokarst. My 2016 field program will continue to focus on: (1) the analysis of the stability of ice-rich permafrost in response to changes in the active layer, and (2) analysis of changes in ice wedge morphology. The latter includes 2 new students (M. Templeton – MSc and C. Grand'Maison BSc. The measurement of changes occurring in the active layer remains a key focus as well as identifying connections between the atmosphere, active layer and permafrost. Fieldwork is planned for the Expedition Fiord area on Axel Heiberg Island (79º25N; 90º43'W) and the Eureka area on Ellesmere Island (79º59'N; 85º49'W). These sites were selected in 2012 because they are representative of common ecosystems, because of their accessibility, availability of baseline data, and existing research facilities. Together this research will assess the sensitivity of key permafrost systems to warming by defining the surface temperature fluxes in the active layer and at the active layer permafrost interface. This study will identify critical thresholds of non-recoverable change known as tipping points, and potential feedbacks. In 2016 we are asking 3 questions: (1)*:* To what extent are current changes in the landscape due to climate change? (2) To what extend does the active layer buffer the permafrost system through complex feedbacks linked to the way energy interacts with soil and thawing? And (3) what are the mechanisms that cause ice wedge polygons to collapse so rapidly? Activities planned for 2016 include: (a) ongoing measurement of changes in the ground surface using a high resolution gps system coupled with ground penetrating radar. These data will be included in a geographic information system and will be used to georeference satellite images, (b) monitoring active layer processes and the measurement of temperature and moisture changes in mid-summer. This will involve the collection of sediment and ice samples from the active layer an top of permafrost, and (c) continued aerial surveys of changes throughout the Fosheim Peninsula.

Significance:

My research has made a significant contribution to the understanding of permafrost and ground ice conditions in the high Arctic. It provides new insights into the origin and age of permafrost systems, rates of change and the potential vulnerability of ice cored landforms. The magnitude of warming projected for the high Arctic will have significant effects on both the ecology and geomorphology of the region. This work is even more important given the increased level of mineral exploration interests in this area.

W.Pollard 

2016 ᓄᓇᕗᑦ ᖃᐅᔨᓴᕐᓂᕐᒧᑦ ᐱᔪᓐᓇᐅᑎᑕᕋᓱᑎ ᓄᑕᖑᕐᑎᑦᑎᒋᐊᕿᑎ ᐱᓇᓱᑎ: ᕗᐊᐃᓐ ᐳᓚᕐᑦ: Wayne Pollard

ᐱᓕᕆᐊᖑᔪᑦ ᐊᑎᖓ: ᖃᐅᔨᓴᕐᓗᓂ ᖃᓄᑎᒋ ᐊᓯᓪᓕᕐᑎᒋᓂᐊᕐᒪᖔᑦ ᐅᑭᐅᕐᑕᕐᑐᒥ ᑰᐊᖑᓂᖓ ᓯᓚᐅᑦ ᐅᕿᓯᕚᓪᓕᐊᓂᖓᓄᑦ

ᖃᐅᔨᓴᕐᑎᐅᔪᖅ: ᓗᒃᑕᖅ ᕗᐊᐃᓐ ᐳᓚᕐᑦ Dr. Wayne Pollard, ᐃᓕᓴᐃᔨᒻᒪᕆᒃ, ᓄᓇᓕᕆᓂᕐᒧᑦ, ᐃᓕᓐᓂᐊᕐᕕᒃᔪᐊᕐᒥ ᒪᒋᐅᓪ Department of Geography, McGill University, 805 Sherbrooke St. W. Montreal, Quebec. H3A 0B9

2016 ᖃᐅᔨᓴᕐᑎᐅᔪᑦ ᑭᓇᒃᑯᒻᒪᖔᑕ: ᕗᐊᐃᓐ ᐳᓚᕐᑦ, Wayne Pollard, (PI), ᑯᕆᔅ ᐊᒥᓚᓐ Chris Omelon, ᑕᐃᐅᓪ ᐋᓐᑐᓴᓐ Dale Andersen, ᑎᓂᔅ ᓚᓯᐅᓪ Denis Lacelle, ᒪᐃᑯ ᑎᑉᐳᑕᓐ Michael Templeton (M.Sc.), ᒥᓕᓴ ᕗᐊᑦ Melissa Ward (Ph.D.) ᐊᒻᒪᓗ ᐃᓕᓐᓂᐊᕐᐸᓪᓕᐊᔪᖅ ᐃᑲᔪᕐᑎᐅᓪᓗᓂ ᒪᒋᐅ ᐃᓕᓐᓂᐊᕐᕕᒃᔪᐊᒥᑦ ᑖᓐᓇ ᐃᓕᓐᓂᐊᕐ/ᒃᔪᐊᕐᒥ ᐱᒋᐊᕐᑎᑕᐅᓯᒪᔪᖅ ᖃᐅᔨᓴᕐᓂᖅ.

2016 ᐱᒋᐊᕐᕕᒋᓂᐊᕐᑕᖓ ᐅᓪᓗᖓ: ᐸᕐᓇᒃᑕᐅᔪᖅ ᐱᒋᐊᕐᓗᑎᒃ ᔪᓚᐃ 15-ᐊᒋᓯ 30.

2016 ᓄᓇᒥ ᖃᐅᔨᓴᕐᕕᒋᔭᖓ: ᐃᐅᓕᑲ ᖃᓂᒋᔭᓂ ᐅᐃᕙᖓᓂ Fosheim Peninsula, Ellesmere Island (80º00’N 85º95’W),ᐊᒻᒪᓗ ᑲᖏᕐᓗᔪᑦ ᖃᓂᒋᔭᓂ Expedition Fiord area, ᕿᑭᕐᑕᒥ Axel Heiberg Island (79º25’N; 90º45’W). ᐃᓂᖃᕐᓂᕐᓴᐅᖃᑦᑕᕐᓂᐊᕐᑐᒍᑦ ᐃᐅᓕᑲᒥ ᓯᓚᓐᓂᐊᕐᕕᒃᒥ.

ᑮᓇᐅᔭᖃᕐᑎᑦᑎᔪᑦ: ᖃᐅᔨᓴᕐᓂᕐᒧᑦ ᑮᓇᐅᔭᕐᑕᕐᕕᒃ ᓄᓇᒥᒃ ᑭᒃᓕᓯᓂᐊᕐᓂᕐᒧᑦ ᐊᒻᒪᓗ ᐃᓗᓕᖕᒋᓐᓂᒃ ᖃᐅᔨᓴᕐᓂᕐᒧᑦ ᑲᑎᒪᔨᖏᑦ Natural Science and Engineering Research Council (NSERC)ᐊᒻᒪᓗ ᐊᐅᓚᓂᖓᓂᒃ ᐃᑲᔪᕐᑐᐃᔪᑦ ᐅᑭᐅᕐᑕᕐᑐᒥ ᖃᐅᔨᓴᕐᑎᓄᑦ ᐃᑲᔪᖃᑦᑕᕐᑐᑦ Polar Continental Shelf Program

ᐱᓕᕆᐊᖑᔪᖅ ᖃᓄᐃᓕᐅᕐᓂᐊᕐᒪᖔᑕ.
ᐊᕋᒍᓴᒃᓄᑦ ᐊᑯᓂᐅᔪᒧᑦ ᐃᓕᓐᓂᐊᕐᕕᒃᔪᐊᕐᒥ ᐱᓕᕆᐊᖑᔪᖅ ᖃᐅᔨᓇᓱᒃᑐᑦ ᓯᓚᐅᑦ ᐅᖁᓯᕚᓪᓕᐊᓂᖓ ᐃᒃᐱᒃᓇᐅᑎᖃᕐᒪᖔᑦ ᐅᑭᐅᕐᑕᕐᑐᒥ ᖁᐊᖑᓂᖓᓂᒃ ᓄᓇᖓᓂ, ᐱᖁᑎᓄᓪᓗ. ᑎᓴᒪᐅᔪᑦ ᑐᕋᖓᐅᔪᑦ. ᐅᑯᓂᖓ: (1) ᖃᐅᔨᒪᓇᓱᒃᑕᐅᓪᓗᓂ ᓯᓚᐅᑦ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᓂᖓ ᐊᔾᔨᒋᖕᒋᑦᑐᑦ ᓄᓇᐃᑦ (ᓱᕐᓗ ᓇᑎᕐᓇᒥᑦᑐᑦ, ᐱᖑᖕᓂ, ᓯᒃᔭᒥ, ᐃᒪᕐᓱᓂᖕᒋᓐᓂᓗ), (2) ᖃᐅᔨᓴᕐᑕᐅᓗᓂ ᓄᓇᖓ ᓯᓚᒧᑦ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᒃᒪᖔᑦ, (3) ᖃᐅᔨᓇᓱᒃᓗᒍ ᖃᓄᑎᒋ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᑎᒋᒃᒪᖔᑦ ᓄᓇᖓ ᐅᖁᓯᕚᓪᓕᐊᑎᓪᓗᒍ ᐊᐅᒃᐸᓪᓕᐊᑎᓪᓗᒍᓗ ᖁᐊᖑᓂᖓ, ᐊᒻᒪᓗ (4) ᑎᑎᕋᕐᑕᐅᓗᑎᒃ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᔪᑦ ᖃᓄᑎᒋᕐᒪᖔᑦ ᓱᒃᑲᑎᒋᓂᖓᓄ ᐱᕚᓪᓕᐊᓂᖓ ᓄᓇᐅᑦ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᑎᒋᓂᖓ ᓯᓚᐅᑦ ᐅᖁᓯᕚᓪᓕᐊᓂᖓᓄᑦ ᖁᐊᖑᓂᖓᓗ ᐊᐅᒃᐸᓪᓕᐊᓂᖓ(ᐊᐅᒪᓂᖓᑕ ᓄᓇᐅᑦ ᐊᑕᓂ. ᐱᖃᑕ ᑐᕋᖓᐅᔪᖅ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᔪᑦ ᖃᓄᑎᒋ ᐃᒃᐱᒃᓇᐅᑎᖃᕐᒪᖔᑕ ᐅᕐᓱᐊᓗᖃᕐᑐᒧᑦ ᒪᓂᕋᕐᒥ. ᐱᓚᖕᐅᓚᖑᓪᓗᑎᒃ ᒪᓂᕋᐅᑦ ᐊᑕᓂᑦᑐᖅ ᓄᓇᐅᑦ ᖁᐊᖑᓂᖓ ᐊᐅᒃᐸᓪᓕᐊᑎᓪᓗᒍ ᖃᐅᔨᔭᐅᓚᐅᕐᒪᑦ ᐊᕋᒍᖓᓂ 2011 ᐊᒻᒪ 2012. ᑎᑎᕋᕐᑕᐅᔪᑦ ᖃᐅᔨᔭᐅᔪᓪᓗ ᑐᑭᓯᐅᒪᔾᔪᑕᐅᓂᐊᕐᒪᑕ ᖃᓄᕐ ᓯᓚᐅᑦ ᐅᖁᓯᕚᓪᓕᐊᓂᖓ ᐊᒻᒪᓗ ᓄᓇᐅᑦ ᖁᐊᖑᓂᖓ ᐊᐅᒃᐸᓪᓕᐊᑎᓪᓗᒍ ᓯᕗᓂᒃᓴᒧᑦ ᑐᑭᓯᐅᒪᔭᐅᕙᕆᐱᑕᐅᓂᐊᕐᒪᑕ.. ᐃᓕᓐᓂᐊᑎᐅᔪᓪᓗ ᐱᓕᒻᒪᒃᓴᐅᑎᖃᕐᓂᐊᕐᒪᑕ ᐊᔾᔨᖢᖕᒋᑦᑐᓂᒃ ᐃᓕᓐᓂᐊᕐᐸᓪᓕᐊᓗᑎᒃ.

ᖃᓄᐃᓕᕚᓪᓕᐊᓂᖕ ᐱᓕᕆᐊᖕᒋᑕ ᐅᓂᒃᑦ – 2015 ᑭᒃᓕᓯᓂᐊᕐᓂᒃᑯᑦ ᖃᐅᔨᓴᕐᓂᖅ ᐱᔪᓐᓇᐅᑎᖓ ᓈᓴᐅᑕ #02 020 15R-M (ᐊᕋᒍᓴᒃᓄᕐ)
ᐊᕋᒍᖓᓂ 2015 ᐱᓕᕆᐊᖑᔪᑦ ᖃᐅᔨᓴᕐᕕᖃᓚᐅᕐᑐᑦ ᐃᐅᓕᑲ ᖃᓂᒋᔭᓂ ᑲᖏᕐᓗᐊᑕ ᓄᓇᖓᓂ Eureka Sound ᑕᕙᓂᑦᑐᖅ ᕿᑭᕐᑕᒥ Ellesmere Island ᐊᒻᒪᓗ ᑲᖏᕐᓗᒃᒥ ᓄᓇᖓᓂ Expedition fiord ᕿᑭᕐᑕᒥ Axel Heiberg Island. ᐃᓕᓐᓂᐊᕐᑎᐅᔪᖅ ᐅᕙᖓᓗ ᐱᓕᕆᐊᖃᓚᐅᕐᐳᒍᒃ ᖃᓂᒋᔭᓂ ᓯᓚᓐᓂᐊᕐᕕᐅᑦ ᐃᐅᓕᑲᒥ ᐅᓪᓗᓄᑦ 15-ᓄᑦ (ᔪᓚᐃ 1-ᒥᑦ 15-ᒧᑦ) ᐱᔭᐃᓪᓗᑕ ᖃᐅᔨᓴᕐᓗᑕᓗ ᐊᐅᒃᓂᐅᔪᓂ ᓄᓇᓂᒃ ᐊᒻᒪᓗ ᓯᑯᓂᖕᒋᓐᓂᒃ ᖃᓂᒋᔭᓂ ᓯᓚᓐᓂᐊᕈᑕᐅᔪᑦ ᐊᕙᑎᓕᖅᐦᑯᑦ ᑲᓇᑕᒥ, ᒥᑦᑕᕕᖓᓂ ᐊᒻᒪᓗ ᐅᓇᑕᕐᑐᒃᓴᒃᑯᑦ ᐃᓂᒋᔭᖓᓂ. ᐱᓕᖓᐊᖓᔪᒪᓚᐅᕐᑕᕗᑦ ᑲᖏᕐᓗᖓᑕ ᓄᓇᖓᓂ Expedition Fiord area ᕿᑭᕐᑕᐅᑦ Axel Heiberg Island ᓄᖃᕐᑎᑕᐅᔭᖕᐊᖃᓚᐅᕐᒪᑦ ᐃᓗᓕᖕᒋᓐᓂᒃ ᐊᐅᓚᔾᔪᑕᐅᔪᑦ ᐃᓚᑯᓗᐊᕐᓂᖕᒋᓐᓄᑦ ᐃᑲᔪᕐᑕᐅᖕᒋᓗᐊᕐᓂᑦᑎᓐᓄᑦ. ᓄᓇᒥ ᐃᐅᓕᑲ Eureka ᓄᓇᖓᓂᒃ ᖃᐅᔨᓴᕐᓗᑕ, ᓄᓇᖑᐊᒃᑯᓪᓗ ᓇᓗᓇᐃᒃᓯᓪᓗᑕ ᐊᒻᒪᓗ ᐱᕈᕐᑐᐃᑦ ᖃᐅᔨᓴᕐᑕᐅᓚᐅᕐᑐᑦ ᐊᔾᔨᒋᖕᒋᑦᑐᑦ ᓂᓚᐅᓂᖕᒋᑦ. ᓂᓚᒃ ᐊᒻᒪᓗ ᒪᓂᕋᕐᒥᑦ ᐱᔭᐃᖃᑦᑕᓚᐅᕐᑐᑦ ᖃᐅᔨᓴᕐᑕᐅᓪᓗᑎᒃᓗ ᐃᓗᓕᖕᒋᑦ ᑭᓱᒻᒪᖔᑕ ᐊᒻᒪᓗ ᓂᓚᐅᓂᖓ ᐊᒻᒪᓗ ᒪᓂᕋᕐᒥᑦᑐᑦ ᖁᐊᖑᓂᖓ ᓇᑭᖔᕐᓯᒪᒃᒪᖔᑕ. ᑲᑎᓪᓗᒋᑦ ᒪᓂᕋᕐᒥᑦᑐᖅ ᐊᐅᒃᓴᐅᑕᐅᔪᓐᓇᕐᑐᖅ ᐃᓚᒃᓴᐅᔪᖅ Total Soil Carbon ᐱᑕᖃᓚᐅᕐᑐᖅ ᖃᖓᓂ ᓄᓇᐅᑦ ᐊᑎᓚᐅᕐᑐᑦ ᐊᑎᒃᓂᖃᕐᓗᑎᒃ < 1% ᑭᓯᐊᓂ ᖁᑦᑎᒃᓂᕐᓴᐅᓚᐅᕐᑐᖅ (2-3%) ᐃᒪᕐᓱᕈᔪᓂᖓᓂ. ᐊᐅᒃᐸᓪᓕᐊᓂᖓ

ᖁᐊᖑᓂᖓᑕ ᒪᓂᕋᒥᑦᑐᖅ ᐊᔾᔨᐸᓗᒋᓚᐅᕐᑕᖓ ᐊᕋᒍᖏᓐᓂ 2013 ᐊᒻᒪ 2014 ᐊᑦᑎᒃᓂᖅᓴᐅᓚᐅᕆᓪᓗᓂᓗ ᑕᑯᔭᐅᓯᒪᔪᓂ ᐊᕋᒍᖏᓐᓂ 2011 ᐸᒻᒪ 2012...
ᐃᐅᓕᑲᒥ ᖃᓂᒋᔭᓂ ᒪᓂᕋᖓᓂ ᖁᐊᖑᓂᖓ ᓂᓚᖃᐅᕐᒪᑦ ᓴᙱᔾᑐᒥᒃ (ᐊᖏᓂᕋᕐᑕᐅᔪᖅ ᓂᓚᐅᓂᖓ (3-10m) ᖁᐊᖑᓂᖓ ᐃᔾᔪᑎᒋᓗᓂ ᓂᓚᑐᐃᓐᓇᐅᔪᖅ ᐊᑕᓂ ᐃᖃᖓᓂᑦᑐᕕᓃᑦ ᐃᔾᔪᓂᖃᕐᑐᖅ ᖃᖓᓂᑦᑐᖅ 1-4 m. ᖃᒐᓃᑦᑐᖅ ᓄᓇᐅᑦ ᐃᒃᐱᒃᓂᖅᓴᕋᐃᑦᑐᒃᒪᑦ ᐊᐅᒃᐸᓪᓚᐊᓂᖓᓄᑦ ᐱᔾᔪᑎᒋᓪᓗᒍ ᒪᓂᕋᐅᑦ ᐊᑕᓂ ᖁᐊᖑᓂᖓᓄᑦ. ᐱᓕᕆᐊᕆᔭᒃᑲ ᐊᕋᒍᓄᑦ 20-ᓄᑦ ᓇᓗᓇᐃᕐᓯᓯᒪᔪᑦ 10-ᓂᒃ ᐊᑐᓂ ᓄᓇᐃᑦ ᐊᖏᓈᕐᓗᒋᑦ ᓄᓇᐅᑦ ᐃᓗᐊᓂᑦᑐᑦ ᓂᓚᐅᓂᖓ ᖃᖓᓄᐊᕐᐸᓪᓚᐊᓂᖓᓂᒃ. ᑕᐃᒪᖓᑦ 2011 ᖃᐅᔨᓚᐅᕐᑐᒍᑦ ᐊᐅᒃᓂᖅᓴᐅᓂᖓᓂᒃ ᓄᓇᐅᑦ ᐃᓗᐊᓂᑦᑐᖅ ᐊᑖᓐᓂᖓᓂᒃ ᓈᓴᐅᑎᒃᑯᑦ 150 M asl 2012-ᒥ ᐅᖃᓚᐅᕋᑦᑕ ᐊᔾᔨᖃᖏᑦᑐᒥᒃ ᐅᖁᓂᖃᕐᓂᖓᓂᒃ (250+ ᖃᑦᑎᒃᓯᓚᕐᓯᒪᔪᑦ ᐊᐅᒃᓂᑦ ᓄᓇᒥ) ᑭᓯᐊᓂ ᐊᕋᒍ 2015 ᒥᑭᓐᓂᖅᓴᐅᓕᓚᐅᕐᑐᑦ. ᖃᐅᔨᕐᑎᐅᔪᖅ ᐃᓕᓐᓂᐊᑐᖅ L. ᐱᑯ M. Becker
ᐱᔭᓈᕐᓯᓚᐅᕐᑐᖅ ᖃᐅᔨᓴᕐᓂᕐᒥᒃ ᐊᐅᒃᐸᓪᓚᐊᓂᖓᓂᒃ ᓄᓇᐅᑦ ᖃᑦᑎᒃᓯᕙᓪᓚᐊᓂᖓᓄᑦ ᐊᐅᒃᐸᓪᓚᔪᖅ ᐱᕿᑦᑐᓄᑦ ᐃᒃᐱᒃᓇᐅᑎᖃᕐᓂᖓᓂᒃ. ᖃᐅᔨᓴᕐᓂᐅᔪᖅ ᐊᐅᒃᐸᓪᓚᐊᓂᖓᓂᒃ ᒥᑭᒃᓚᕙᓪᓚᐊᓂᖓᓂᒃ ᑲᔪᓯᒋᐊᕐᑕᐅᓪᓗᓂ ᓄᑕᖑᔪᖅ ᖃᐅᔨᓴᕐᓂᐅᔪᖅ ᐃᓕᓐᓂᐊᕐᑎᐅᔪᒧᑦ L. ᕗᐊᑦ M. Ward.
ᐊᒻᒪᓗᑦᑕᐅᖅ ᖃᐅᔨᓴᕐᑕᐅᓪᓗᓂ ᒪᓂᕋᖓ ᐊᐅᒃᐸᓪᓚᐊᓂᖓ ᐊᑐᕐᑕᐅᓪᓗᑎᒃ ᖃᕋᓴᐅᔭᒃᑯᑦ ᖃᖓᑦᑕᕐᑎᑕᐅᓯᒪᔫᒃᑯᑦ ᑕᑯᓪᓗᓂᒋᑦ ᓄᓇᐃᑦ ᓄᓇᖑᐊᒃᑯᓪᓗ ᑕᒻᒪᕆᒃᑯᑎ ᐊᑐᕐᓗᒋᑦ ᓇᓴᐅᑎᖏᑦ ᔪᓚᐃᒥ ᐱᓕᕆᐊᕗᑦ ᐱᖃᓯᐅᑎᓚᐅᕐᑐᖅ ᒪᓂᕋᐅᑦ ᓄᓇᐅᓪᓗ ᐊᑕᓂ ᖃᐅᔨᐅᑎᓂᒃ ᐊᑐᕐᓗᑎᒃ ᖃᑦᑎᒃᓯᓚᕐᓯᒪᔪᑦ ᓂᓚᐅᓂᖏᑦ, ᖃᐅᔨᓴᒃᑲᒃᓴᓂᒃᓗ ᐱᔭᐃᓪᓗᑎᒃ ᐊᒻᒪᓗ ᖃᖓᑦᑕᕐᑎᑕᐅᓯᒪᔫᒃᑯᑦ ᖃᐅᔨᓴᕐᓗᑎᒃ.

2016 ᐱᓕᕆᐊᕆᓂᐊᕐᑕᕗᑦ

2016-ᒥ ᑲᔪᓯᒋᐊᕐᓂᐊᕐᑕᕗᑦ ᖃᐅᔨᓴᕐᓂᕗᑦ ᓯᓚᐅᑦ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᓂᖓ ᖃᓄᕐ ᐃᒃᐱᒃᓇᐅᑎᖃᕐᒪᖓᑦ ᓄᓇᐅᑦ ᖁᐊᖑᓂᖓᓄᑦ ᖃᓄᑎᒋᓗ ᐊᐅᒃᐸᓪᓚᐊᑎᒋᒃᒪᖓᑦ. 2016-ᒥ ᖃᐅᔨᓴᕐᓂᕗᑦ ᑲᔪᓯᓂᐊᕐᑐᖅ ᐱᓕᕆᐊᖃᕐᓗᑕ ᐅᑯᓂᖓ (1) ᖃᐅᔨᓇᓱᒃᓗᑕ ᓱᕋᖏᒃᑲᓗᐊᕐᒪᖓᑦ ᖃᓄᑎᒋᓗ ᐊᓯᓕᕐᐸᓪᓕᐊᒃᒪᖓᑦ ᓂᓚᐅᓂᖓ ᖁᐊᖑᐃᓐᓇᕐᑐᖅ ᖃᖓᓂᑦᑐᖅ ᒪᓂᕋᐅᑦ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᑎᓪᓗᒍ, ᐊᒻᒪᓗ (2) ᖃᐅᔨᓴᕐᓗᑎᒍ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᔪᑦ ᓂᓚᐅᓂᖏᑦ ᐊᐅᒃᐸᓪᓕᐊᓂᖏᑦ. ᐱᖃᑕ ᑲᒪᒋᔭᐅᓂᐊᕐᑐᖅ ᒪᑭᒃᓄᑦ ᐃᓕᓐᓂᐊᕐᑎᐅᔫᒃᓄᑦ ᓄᑕᖑᔫᒃ (L. ᑎᒻᐳᑖ ᐊᒻᒪᓗ ᓴ. ᒍᕋᓐ M. Templeton – MSc and C. Grand’Maison BSc) ᐅᑐᕋᕐᑕᐅᓗᑎᒃ ᖃᓄᑎᕐᒪᖓᑕ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᔪᑦ ᖃᖓᓂᑦᑐᒧᑦ ᓄᓇᒥ ᖃᓄᕐᓗ ᐊᒃᑐᐊᓂᖃᕐᒪᖓᑦ ᓯᓚᒧᑦ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᓂᖓᓄᑦ, ᖃᖓᓂᑦᑐᖅ ᐊᒻᒪᓗ ᖁᐊᖑᐃᓐᓇᕐᑐᖅ. ᐱᓕᕆᐊᕆᓂᐊᕐᑕᕗᑦ ᑲᖏᕐᓗᐊᑕ ᓄᓇᖓᓂ Expedition Fiord ᕿᑭᕐᑕᒥ Axel Heiberg Island (79º25N; 90º43’W) ᐊᒻᒪᓗ ᐃᐅᓕᑲ Eureka ᕿᑭᕐᑕᒥ Ellesmere Island (79º59’N; 85º49’W). ᑕᒃᑯᐊ ᖃᐅᔨᓴᕐᕕᐅᔫᒃ ᓂᕈᐊᕐᑕᐅᓚᐅᕐᓯᒪᔫᒃ 2012 ᐱᔾᔪᑎᒋᓪᓗᒍ ᐊᔾᔨᖃᓚᖑᒃᒪᑕ ᐊᕙᑕᓂᑦᑐᖅ ᓄᓇᖓ ᑕᑯᓪᓗᒍ, ᐅᐸᒃᓴᐅᓪᓗᑎᒃᓗ, ᐱᒋᐊᕐᕕᒋᔪᓐᓇᕐᑕᕗᓪᓗ ᖃᓄᑎᕐᓂᖓ ᑎᑎᕋᕐᓯᒪᓂᖓᓄᑦ ᐊᒻᒪᓗ ᖃᐅᔨᓴᕐᕕᖃᕐᓂᖓᓄᑦ. ᑖᓇ ᖃᐅᔨᓴᕐᓂᐅᔪᖅ ᖃᐅᔨᓴᕐᓂᐊᕐᑐᑦ ᖃᓄᑎ ᐃᒃᐱᒃᓂᖅᓴᕋᐃᑎᒋᒃᒪᖓᑦ ᖁᐊᖑᓂᖏᑦ ᐅᖁᓯᕙᓪᓕᐊᑎᓪᓗᒍ ᖃᖓᓂᑦᑐᑦ ᐅᖁᓂᖓᓂᕋᐅᑦ ᐊᓯᓪᓕᕐᐊᓪᓕᐊᑎᒋᒃᒪᖓᑦ ᐊᒻᒪᓗ ᑮᓪᓕᖓᑕ ᖁᐊᖑᓂᖓᑕ ᖃᓄᑎ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᑎᒋᒃᒪᖓᑦ. ᖃᐅᔨᓴᕐᓂᐅᔪᖅ ᓇᓗᓇᐃᕐᓯᔾᔪᑕᐅᓂᐊᕐᑐᖅ ᐱᓪᓚᕆᐅᔪᑦ ᑮᓪᓕᒋᔭᖏᑦ ᐊᓯᓪᓕᕐᓂᖏᓐᓄᑦ ᑐᑭᓯᔭᐅᒋᐊᕐᓗᓂᓗ ᐊᓯᓪᓕᕈᓂ ᐅᑎᕈᓐᓇᐃᓕᒐᔭᕐᓂᖓ. ᐊᕋᒍᒥ 2016 ᐊᐱᕐᑯᑎᖃᕐᓂᐊᕐᑐᒍᑦ ᐱᖓᓱᓂᒃ (3) (1): ᖃᓄᕐᓕ ᓯᓚᐅᑦ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᔪᑦ ᐊᓯᓪᓕᐅᑎᕆᓯᒪᓕᕐᐸ ᓄᓇᒧᑦ ? (2) ᖃᖓᓂᑦᑐᖅ ᓄᓇᐅᑦ ᐊᐅᒃᓇᓴᕈᑎᒋᓂᐊᕐᐸ ᐊᑕᓂᑦᑐᒧᑦ ᖁᐊᖑᓂᖓᓄᑦ ᓯᓚᒥᖓᕐᑐᖅ ᖃᓄᑎ ᐃᓯᕐᐸᓪᓕᐊᑎᒋᕙ ᐊᐅᒃᐸᓪᓕᐊᓂᖓᓄᑦ? (3) ᑭᓱᒧᑦ ᐊᐅᒃᓴᓕᖃᑦᑕᕐᒪᑦ ᖃᑦᑎᒃᓯᓕᕐᓯᒪᔪᑦ ᓄᓇᒥᑦᑐᑦ? ᐱᓕᕆᐊᕆᔭᐅᓂᐊᕐᑐᑦ ᐊᕋᒍᖓᓂ 2016 ᐅᑯᐊᖑᔪᑦ:
(ᐃ) ᐅᒃᑐᕋᕐᑕᐅᓯᒪᔪᑦ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᓂᖓ ᒪᓂᕋᒥᑦᑐᑦ ᖃᕋᓴᐅᔭᒃᑯᑦ ᖃᐅᔨᓴᐅᑎᓂᒃ ᐊᑐᕐᓗᑎᒃ, ᖃᐅᔨᓴᐅᑕᐅᔪᓪᓗ ᑎᑎᕋᕐᑕᐅᒃᐸᑕ ᐱᖃᓯᐅᔾᔨᓯᒪᓂᐊᕐᑐᖅ ᓄᓇᐅᑦ ᐊᕿᒃᓯᒪᓂᖓᓂᒃ ᖃᖓᑦᑕᕐᑎᑕᐅᓯᒪᔫᒃᑯᑦ ᐊᔾᔨᓕᐅᕐᓯᒪᔪᑦ, (ᐱ) ᐃᓗᓕᖃᐅᕐᓗᓂ ᖃᐅᔨᓴᕐᓂᐅᔪᖅ ᖃᖓᓂᑦᑐᖅ ᐊᐅᓚᓂᖓ ᐊᒻᒪᓗ ᐅᒃᓱᕋᕐᑕᐅᓗᓂ ᐅᖁᓂᖓ ᒪᓴᐅᓂᖓᓗ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᓂᖏᑦ ᐊᐅᔭᒃᑯᑦ. ᑲᑎᑦᑎᓗᑎᒃᓗ ᖃᐅᔨᓴᒐᒃᓴᓂᒃ ᑲᑕᒐᒃᓂᑯᓂᑦ ᐊᒻᒪᓗ ᓂᓚᒃᓂᒃ ᖃᖓᓂᑦᑐᓂᒃ ᖁᐊᖑᓂᖓᑕ ᖃᖓᓂᑦ, ᐊᒻᒪᓗ (ᑎ) ᑲᔪᓯᓗᒍ ᖃᖓᑕᓱᒃᑯᑦ ᖃᐅᔨᓴᕐᓂᖏᑦ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᔪᑦ ᑕᑯᔭᐅᓴᓱᒃᓗᑎᒃ ᐅᐃᕙᖓᓂ Fosheim Peninsula.

ᐱᓪᓚᕆᐅᓂᖓ:

ᑖᓇ ᖃᐅᔨᓴᕐᓂᐅᔪᖅ ᐱᒋᐊᕐᑎᑦᑎᔾᔪᑕᐅᔪᖅ ᐱᓪᓚᕆᐅᔪᓂᒃ ᑐᑭᓯᔭᐅᕙᓪᓕᐅᑕᐅᓪᓗᓂᓗ ᖁᐊᖑᐃᓐᓇᕐᓂᖓ ᓄᓇᐅᑦ ᐃᓗᐊᓂᑦᑐᖅ ᐊᒻᒪᓗ ᖃᖓᓂᑦᑐᖅ ᓂᓚᐅᓂᖓ ᖃᓄᐃᓕᕙᓪᓕᐊᓂᖓᓂᒃ ᐅᑭᐅᕐᑕᕐᑐᒥ. ᑐᑭᓯᕙᓪᓕᐅᑕᐅᓪᓗᓂᓗ ᓄᑕᓂᒃ ᑐᑭᓯᐅᒪᔭᐅᓚᐅᖏᑦᑐᓂᒃ ᓇᑭᖓᕐᓯᒪᒃᒪᖓᑦ ᖁᐊᖑᓂᐊ ᓄᓇᐅᑦ ᐃᓗᐊᓂᑦᑐᖅ ᐊᒻᒪᓗ ᖃᓄᕐ ᐱᑐᖃᐅᑎᒋᒃᒪᖓᑦ, ᖃᓄᑎᒋᓗ ᐊᓯᓪᓕᕐᐸᓪᓕᐊᑎᒋᒃᒪᖓᑦ ᐊᒻᒪᓗ ᓄᓇᐃᑦ ᐊᑕᓂᑦᑐᓕᒃ ᓂᓚᒃᒥᒃ ᖃᓄᐃᓕᖓᓂᐊᕐᒪᖓᑕ ᐊᐅᒃᐸᓪᓕᐊᑎᓪᓗᒍ. ᖃᓄᑎᒋᓗ ᐅᖁᓯᕙᓪᓕᐊᓂᖓ ᐅᑭᐅᕐᑕᕐᑐᒧᑦ ᐃᒃᐱᒃᓇᐅᑎᖃᕐᓂᐊᕐᒪᖓᑦ ᐊᕙᑎᖓᓄᑦ ᓄᓇᒥᑦᑐᓄᓪᓗ. ᑖᓇ ᐱᓕᕆᐊᖑᔪᖅ ᐱᓪᓚᕆᐅᔪᑎᖃᕐᒥᔪᖅ ᐅᔭᕋᒃᓯᐅᕈᒪᕙᓪᓕᐊᑎᓪᓗᒋᑦ ᑕᒪᓂ.

W.Pollard