20 January 2023

Mosha Cote
Research Liaison
Nunavut Research Institute
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RE: Scientific Research License # 03 003 22R-M

Dear Mr. Cote,

Please accept this 2022 Annual Summary Report for the Nunavut Research Institute scientific research license # 03 003 22R-M. There are no changes to the study area, or research methods associated with this research license. We would like to request renewal of this license so that we can continue to collect and analyze multi-year permafrost data from the existing instrumentation (ground temperature, air temperature, water temperature, moisture content, and ground heave).

I am currently preparing an amendment application for this research licence to extend the use of geophysical surveys over lakes. The research method is not significantly different from methods documented in the current research license, but will involve data collection supported by snow machine over lake ice. I will keep you informed of the amendment process.

Any visits to Nunavut communities will be conducted in strict accordance with evolving public health guidelines and directives issued by Nunavut, the Federal Government, and any applicable local authorities.

1) April–October 2023: 2 personnel (Greg Oldenborger, A.-M. LeBlanc, or B. Faucher) from the Geological Survey of Canada, Ottawa for approximately 10–20 days for data retrieval and instrument maintenance for existing instrument sites in the Rankin Inlet area.

Best Regards,
Greg Oldenborger
Geological Survey of Canada
Natural Resources Canada
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Nunavut Scientific Research License # 03 003 22R-M: 2022 Annual Summary

The Kivalliq region of Nunavut is undergoing significant infrastructure development associated with natural resources, transportation, energy, and community infrastructure. Information on permafrost is required to ensure resilience in the face of climate change. Measurements of ground temperature and observations of ground ice conditions are critical for permafrost characterization, but are sparse in the Kivalliq region of Nunavut.

In the summer of 2016, the Geological Survey of Canada and the Canada-Nunavut Geoscience Office started a multi-year research study on permafrost for the western coast of Hudson Bay with focus on the Rankin Inlet area. Fieldwork has involved: 1) landscape observations and examination of surficial geological materials, 2) installation of permanent boreholes to record long-term permafrost temperatures in the Hamlet of Rankin Inlet for developed and undeveloped land use, 3) installation of several shallow permafrost monitoring stations in the vicinity of Rankin Inlet, 4) collection of permafrost cores and geophysical data to detect ground ice, 5) observations and measurements of water level changes, and 6) collection of satellite remote sensing data to monitor ground subsidence associated with thawing.

The global COVID pandemic has limited field operations since 2020. A short field visit to Rankin Inlet was possible in the summer of 2021, followed by a 5-day field visit to Rankin Inlet conducted by LeBlanc and Faucher in September 2022. Fieldwork consisted of data collection, instrument maintenance, and repair at existing sites. These visits were crucial to maintain the integrity and continuity of data records. In the last two years, efforts have transitioned to analysis and synthesis of the data collected since inception of the project. Ground-based and satellite data have been integrated to develop methods for predicting ground subsidence associated with thawing permafrost. The utility of using drone-based data for mapping topography, geology, and permafrost conditions was assessed by comparison of drone imagery and products to satellite and ground-based observations. Satellite data were also used to produce a ground subsidence map over the region of Arviat, and to map permafrost features along the Kivalliq hydro-fibre corridor.

Ground temperature data from ten permafrost sites near Rankin Inlet are currently being analyzed for the period of 2017–2022. Monthly means, minimum, and maximum annual temperature envelopes, and active layer thickness will be published in a format suitable for stakeholders. Permafrost cores collected in 2017 and 2018 have been analyzed using CT-scanning to precisely quantify ground ice content and legacy permafrost information is being compiled from old geotechnical boreholes records from the oil and gas industry. These data are being used in the development of a regional ground ice map and a summary of the permafrost knowledge for the Kivalliq region.

ᔮᓐᓂᐊᕆ 20, 2023

ᒨᓴ ᑰᑕᐃ
ᖃᐅᔨᓴᖅᑐᓕᕆᓂᕐᒧᑦ ᑐᑭᓯᕕᐊᕐᕕᒃ
ᓄᓇᕗᑦ ᖃᐅᔨᓴᖅᑐᓕᕆᔨᒃᑯᑦ
ᑎᑎᖅᑲᒃᑯᕕᖓ 1720, ᐃᖃᓗᐃᑦ, ᓄᓇᕗᑦ X0A 0H0
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ᐱᔾᔪᑎᖓ: ᖃᐅᔨᓴᕐᓂᕐᒧᑦ ᓚᐃᓴᔅᓯᖓ # 03 003 22R-M

ᑰᑖᖓᐃ,

ᐅᓇ ᐱᔭᐅᕐᑯᔭᒃᑲ 2022 ᐊᕐᕋᒍᑕᒫᖅᓯᐅᑎᒧᑦ ᓇᐃᓈᖅᓯᒪᔪᖅ ᐅᓂᒃᑳᖅ ᓄᓇᕗᑦ ᖃᐅᔨᓴᖅᑐᓕᕆᔨᒃᑯᓐᓅᖔᖅᑐᖅ ᓚᐃᓴᔅᓯᖓᑦᑕ ᓈᓴᐅᑎᖓ # 03 003 22R-M. ᐊᓯᔾᔨᖅᓯᒪᔪᖃᖕᖏᑦᑐᖅ ᖃᐅᔨᓴᐅᑎᒥᒃ, ᐅᕝᕙᓘᓐᓃᑦ ᐃᓕᖅᑯᓯᖏᓐᓂ ᖃᐅᔨᓴᕐᓂᖓᓐᓂ ᑖᔅᓱᒧᖓ ᓚᐃᓴᔅᓯᒧᑦ. ᓄᑖᕈᖅᑎᑕᐅᕐᑯᔭᕋᓗᐊᕙᑦ ᓚᐃᓴᔅᓯ ᑲᔪᓯᒍᒪᓪᓗᑕ ᓄᐊᑦᑎᓂᑦᑎᓐᓂ ᖃᐅᔨᓴᕐᓂᓂᑦᑎᓐᓗ ᐊᕐᕌᒍᓴᕐᓂᑦ ᓄᓇᐅᑉ ᐃᑭᐊᖓᓂ ᕐᑯᐊᕐᒥᑦ ᐱᑕᖃᓅᖅᑐᓂᒃ ᖃᐅᔨᓴᐅᑎᒋᕙᑦᑕᑎᓐᓂ (ᓂᓪᓚᓇᕐᓂᖓᓐᓂ, ᐊᓂᕐᓂᐅᑉ ᓂᓪᓚᓇᕐᓂᖓ, ᐃᒪᖓᑕ ᓂᓪᓚᓇᕐᓂᖓ, ᕿᐅᒃᑲᖓᓂᖓ, ᐊᒻᒪᓗ ᓄᓇ ᑲᑎᖓᖓᓂᖓᓂ).

ᒫᓐᓇᐅᔪᖅ ᐊᓯᔾᔨᕈᒪᓚᐅᒃᑯ ᑐᔅᓯᕋᐅᑎᒃ ᖃᐅᔨᓴᕐᓂᕐᒧᑦ ᓚᐃᓴᔅᓯ ᖃᐅᔨᓴᕈᒪᓪᓗᖓ ᑕᓯᕐᓂᑦ ᓄᓇᖏᓐᓂ. ᖃᔨᓴᕐᓂᖅ ᐊᓯᔾᔩᓗᐊᕋᔭᖕᖏᑦᑐᖅ ᑎᑎᕋᖅᑕᐅᓂᖏᓐᓂ ᖃᐅᔨᓴᕐᓂᕐᒧᑦ ᓚᐃᓴᔅᓯᖓ ᒪᓕᑦᑐᒍ, ᑭᓯᐊᓂᓕ ᓄᐊᑦᑎᑐᐃᓐᓇᕋᔭᖅᑐᒍᑦ ᐊᐳᑏᔭᐃᑎᓂᑦ ᑕᓯᕐᒥᑦ ᕐᑯᐊᕐᒥᑦ. ᑐᓴᐅᒪᑏᓐᓇᕋᔭᓇᒃᑭᑦ ᐊᓯᔾᔨᓂᖅᑲᑕ ᐃᓕᖅᑯᓯᕗᑦ.

ᓄᓇᓕᓐᓅᖅᑐᖃᖅᑲᑦ ᐱᓕᕆᖃᑦᑕᕋᔭᖅᑐᑦ ᒪᓕᒐᕐᓂᑦ ᒪᓕᑦᑎᐊᕐᓗᑎᑦ ᐋᓐᓂᐊᖅᑐᓕᕆᔨᒃᑯᓪᓗ ᐊᑐᐊᒐᖏᓐᓂ ᐊᒻᒪᓗ ᑎᓕᔭᐅᔾᔪᑎᒋᓯᒪᔭᖏᓐᓂ ᓄᓇᕗᒻᒥ, ᒐᕙᒪᑐᖃᒃᑯᓐᓂ, ᐊᓯᖏᓐᓂᓪᓗ ᒪᓕᒐᕐᓂᑦ ᒪᓕᒋᐊᖃᖅᑕᖏᓐᓂ.

1) ᐊᐃᐳᓗᒥ ᐊᑦᑑᐸᐃᓗᒧᑦ 2023: ᒪᕐᕉᓐᓂᒃ ᐃᖅᑲᓇᐃᔭᖅᑏᓐᓂᒃ (ᒍᕋᒃ ᐆᑕᓐᐳᒍ, ᓕᐸᓛᒃ, ᐅᕝᕙᓘᓐᓃᑦ ᐹᑦᓯ) ᓄᓇᓕᕆᓂᕐᒥᑦ ᖃᐅᔨᓴᖅᑏᑦ ᑲᓇᑕᒦᖔᖅᓯᒪᔪᑦ, ᐋᑐᕝᕕ ᐅᓪᓗᓄᑦ ᑕᒫᓂᖃᐃ ᖁᓕᓄᑦ ᐊᕙᑎᓄᑦ ᓄᐊᑦᑎᒐᔭᖅᑐᑦ ᑕᒪᒃᑯᓂᖓ ᐊᑐᕐᓗᑎᑦ ᐊᑐᓇᐊᓕᒻᒥᓂᒃ ᑲᖏᖅᖢᓂᕐᒥ.

ᑎᑎᖅᑲᖅᑐᖅ,
ᒍᕋᒃ ᐆᑕᓐᐳᒍ
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ᓄᓇᕗᑦ ᖃᐅᔨᓴᖅᑐᓕᕆᓂᕐᒧᑦ ᓚᐃᓴᓐᓯᖓ # 03 003 22R-M: 2022 ᐊᕐᕌᒍᑕᒫᖅᓯᐅᑎ ᓇᐃᓈᖅᓯᒪᔪᖅ ᐅᓂᒃᑳᖅ

ᑭᕙᓪᓕᕐᒥᑦ ᓄᓇᕗᒻᒥ ᐊᖏᔪᐊᓗᒻᒥᑦ ᐊᐅᓚᔾᔪᑎᓭᓂᒃ ᐱᕙᓪᓕᐊᔪᑦ ᓄᓇᓕᕆᓂᕐᒥᓐᖓᖅᑐᓂᒃ, ᐃᖏᕋᔪᓕᕆᓂᕐᒧᑦ, ᐆᒻᒪᖅᑯᑎᓄᑦ, ᓄᓇᓕᓐᓂᓪᓗ ᐊᐅᓚᔾᔪᑎᓭᐅᒐᔭᖅᑐᓂᒃ. ᑐᑭᓯᒋᐊᕈᑏᑦ ᓄᓇᐅᑉ ᐃᑭᐊᖓᓂ ᖁᐊᖑᔪᑦ ᖃᐅᔨᓴᖅᑕᐅᒋᐊᖃᕐᖓᑕ ᐊᐅᑦᑕᐅᑎᒋᓕᓐᖏᒃᑲᓗᐊᕐᒪᖔᑕ ᓯᓚ ᐊᓯᔾᔨᑉᐸᓪᓕᐊᓂᖓᓐᓄᑦ. ᖃᐅᔨᓴᖅᑕᐅᖃᑦᑕᕋᔭᖅᑐᑦ ᓂᐱᓕᓇᓂᖏᑦ ᕿᒥᕐᕈᔭᐅᖃᑦᑕᕐᓗᑎᓪᓗ ᖁᐊᖑᓂᖏᑦ ᓄᓇᐃᑦ ᐱᓗᐊᖅᑐᒥᑦ ᓄᓇᐅᑉ ᐅᑭᐊᖓᓂ ᖃᓄᐃᓕᕐᒪᖔᑕᓗ, ᑭᓯᐊᓂᓕ ᓵᑦᑐᕈᓘᕙᓕᖅᑐᑦ ᖁᐊᖑᓂᖏᑦ ᑭᕙᓪᓕᕐᒥᑦ ᓄᓇᕗᒻᒥ.

ᐊᐅᔭᒃᑯᑦ 2016–ᒥ, ᓄᓇᓕᕆᓂᕐᒧᑦ ᖃᔨᐅᓴᖅᑏᑦ ᑲᓇᑕᒥ ᐊᒻᒪᓗ ᑲᓇᑕᒥ-ᓄᓇᕗᒻᒥ ᓄᓇᓕᕆᓂᕐᒧᑦ ᖃᐅᓴᖅᑏᑦ ᐊᕐᕋᒍᒐᓴᕐᓄᑦ ᖃᐅᔨᓴᖅᐸᓪᓕᐊᓯᒪᓕᕐᖓᑕ ᓄᓇᐅᑉ ᐅᑭᐊᖓᑕ ᖁᐊᖑᓂᖓᓂ ᐅᐊᓐᓇᖓᓂ ᑲᖏᖅᑐᐊᓘᑉ ᐃᒪᖓᓐᓂ ᐱᓗᐊᖅᑐᒥᑦ ᑲᖏᖅᔫᓂᕐᒥᑦ. ᑕᒪᒃᑯᐊ ᐅᐸᖃᑦᑕᖅᑐᑦ ᓄᓇᒧᑦ: 1) ᓄᓇᐃᑦ ᐅᔾᔨᖅᑕᐅᕙᑦᑐᑎᑦ ᐊᒻᒪᓗ ᕿᒥᕐᕈᔭᐅᓪᓗᑎᑦ ᖃᓐᖓ ᓄᓇᖓ ᑭᓱᖏᓪᓗ, 2) ᐃᖅᓯᓴᑯᑖᓕᐅᕐᓗᑎᑦ ᓄᓇᒧᑦ ᐊᑯᓂ ᖃᐅᔨᓴᖅᑕᐅᖃᑦᑕᕐᓂᐊᕐᖓᑦ ᖁᐊᖑᓂᖓᑕ ᓂᓪᓕᓇᕐᓂᖓ ᑲᖏᖅᔪᓂᕐᒥ ᖃᓄᐃᑉᐸᓪᓕᐊᓕᕐᓂᖓᓂ ᓄᓇᓗ ᐊᑐᖅᑕᐅᓂᖓᓂ, 3) ᐊᒥᓱᒃᐸᓪᓚᓐᓂᑦ ᐃᒃᑲᑦᑐᓂᑦ ᓄᓇᐅᑉ ᐃᑭᐊᖓ ᖃᐅᔨᓴᐅᑎᖃᕐᓗᑎᑦ ᑲᖏᖅᔪᓂᒻᒧᑦ ᖃᓂᑦᑐᒥᑦ, 4) ᓄᐊᑦᑎᓗᑎᓪᓗ ᖃᐅᔨᕓᒥᓂᕐᒥᓂᒃ ᓄᓇᐅᑉ ᐃᑭᐊᖓᓂ ᐊᒻᒪᓗ ᓄᓇ ᖃᓄᐃᑦᑑᓂᖓᓐᓂ ᖁᐊᖑᓂᖏᓐᓂ, 5) ᐅᔾᔨᖅᓱᕐᓗᑎᑦ ᖃᐅᔨᓴᖃᑦᑕᕐᓗᑎᓪᓗ ᐃᒪᐃᑦ ᐊᓯᔾᔨᑉᐸᓪᓕᐊᓂᖏᓐᓂ ᐃᒃᑲᓪᓕᕙᓪᓕᐊᓪᒪᖔᑕ ᐃᑎᓪᓕᕙᓪᓕᐊᓪᒪᖔᑕᓘᓐᓃᑦ, ᐊᒻᒪᓗ 6) ᖃᖓᑦᑕᖅᑎᑕᐅᓯᒪᔪᒃᑰᖅᓯᒪᔪᓂᒃ ᓄᐊᑦᑎᓗᑎᑦ ᐅᔾᔨᖅᓱᖅᑕᐅᓯᒪᔪᓂᒃ ᓄᓇᓂᑦ ᑭᕕᕙᓪᓕᐊᓯᒪᔪᓂᒃ ᐊᐅᑉᐸᓪᓕᐊᓯᒪᔪᓂᒃ.

ᓯᓚᕐᔪᐊᒥ ᐳᖖᕇᓐᓈᓘᓚᐅᖅᓯᒪᒻᒪᑦ ᐊᐅᓪᓚᖅᓯᒍᓐᓇᖃᑦᑕᓚᐅᖅᓯᒪᓐᖏᓇᑦᑕ 2020–ᒥᓂᑦ. ᕿᓚᒥᑲᐃᓐᓇᑯᓗᒃ ᐊᐅᔭᒃᑯᑦ 2021–ᒥ ᑲᖏᖅᔫᓂᕐᒀᑲᐃᓐᓇᓚᐅᖅᓯᒪᒐᓗᐊᕐᒥᔪᒍᑦ, ᐅᓪᓗᓄᓪᓗ ᑕᓪᓕᒪᓄᑦ ᖃᐅᔨᓴᕆᐊᓚᐅᖅᓯᒪᒻᒥᔫᒃ ᓚᐸᓛᒃ ᐊᒻᒪᓗ ᐸᑦᓱ ᔩᑏᑉᐱᕆᒥ 2022–ᒥ. ᐊᐅᓪᓚᖅᓯᒪᓂᖏᓐᓂ ᓄᐊᑦᑎᓚᐅᖅᑑᒃ, ᖃᐅᔨᓴᐅᑎᖏᓐᓂ ᓴᓇᓪᓗᑎᑦ, ᓴᓇᕆᐊᓕᓐᓂᓪᓗ ᖃᐅᔨᓴᕐᕕᖓᓐᓂ. ᖃᐅᔨᓴᕐᓂᐅᔪᑦ ᐱᒻᒪᕆᐊᓘᒻᒪᑕ ᓄᐊᑦᑏᓐᓇᕆᐊᖃᕐᖓᑕ ᑲᔪᓯᓗᑎᑦ ᑎᑎᕋᖃᑦᑕᕐᓗᑎᓪᓗ ᖃᐅᔨᓴᖅᑕᒥᓂᒃ. ᐊᕐᕌᒎᓄᒃ ᒪᕐᕉᓐᓄᒃ ᐊᓂᒍᖅᑑᓐᓄᒃ, ᑕᒪᒃᑯᐊ ᐊᓯᔾᔨᖅᑐᕆᐊᓖᑦ ᐊᓯᔾᔨᐸᓪᓕᐊᓪᓗᒋᑦ ᑲᑎᖅᓱᖅᑐᒋᓪᓗ ᓄᐊᑕᕗᑦ ᑕᐃᒪᓐᖓᓂ ᐱᒋᐊᓚᐅᖅᓯᒪᓕᑦᑎᒍ. ᓄᓇᒦᑦᑐᑦ ᖃᐅᔨᓴᐅᑏᑦ ᖃᖓᑦᑕᖅᑎᑕᐅᓯᒪᔪᒃᑯᓪᓗ ᑲᑎᑎᖅᑐᒋᑦ ᐋᖅᑭᔅᓱᐃᓯᒪᔪᑦ ᒥᔅᓴᐅᓴᒐᓭᓂᒃ ᖃᐅᔨᔭᒥᓂᖏᓐᓂ ᓄᓇᐅᑉ ᐃᑭᐊᖓ ᐊᐅᑉᐸᓪᓕᐊᓕᕐᓂᖓᓐᓂ. ᖁᓛᒎᓕᓐᖑᐊᕐᓄᑦ ᐊᔾᔨᓕᐅᕈᑎᓂᒃ ᓄᓇᒥᑦ ᕿᒥᕐᕈᓪᓗᑕ, ᓄᓇᐃᑦ ᖃᓄᐃᓕᖓᓂᖏᓐᓂ, ᓄᓇᐅᑉ ᐃᑭᐊᖓᓐᓂ ᖁᐊᖑᔪᓂᒃ ᖃᐅᔨᓴᖅᑐᑕ ᐊᔾᔨᓃᓐᖏᓐᓂᖏᓪᓗ ᕿᒥᕐᕋᓕᖅᑐᒋᑦ ᐊᔾᔨᓕᐅᓚᕐᓂᑦ ᖃᖓᑦᑕᖅᑎᑕᐅᓯᒪᔪᒃᑯᓪᓗ ᕿᒥᕐᕈᓪᓗᑎᒍ ᓄᓇᐃᑦ. ᖃᖓᑦᑕᖅᑎᑕᐅᓯᒪᔪᒃᑯᑦ ᓄᐊᑕᒥᓃᑦ ᐊᑐᖅᑕᐅᓪᓗᑎᑦ ᑲᑎᖃᓯᐅᑎᓪᓗᒋᑦ ᓄᓇᖑᐊᑦ ᐊᕐᕕᐊᓂᑦ, ᐊᒻᒪᓗ ᓄᓇᖑᐊᑦ ᓄᓇᐅᑉ ᐃᑭᐊᖓᓂ ᖃᓄᐃᓕᖓᓕᕐᓂᖏᑦ ᖃᖏᑦ ᑭᕙᓪᓕᕐᒥᑦ ᐃᒪᖅᑕᓕᓐᓂᓪᓗ ᐱᓪᓗᑕ.

ᓄᓇᐃᑦ ᓂᓪᓕᓇᕐᓂᖏᓐᓂ ᓄᐊᑦᑎᓪᓗᑎᑦ ᖁᓕᓂᒃ ᓄᓇᐅᑉ ᐃᑭᐊᖓᓂ ᖃᓂᒋᔭᖓᓐᓂ ᑲᖏᖅᔪᓂᐅᑉ ᒫᓐᓇ ᕿᒥᕐᕈᔭᐅᑦᑎᐊᓕᖅᑐᑦ ᐱᒋᐊᓚᐅᖅᓯᒪᓂᑦᑎᓐᓂ 2017–ᒥᑦ ᑎᑭᑦᑐᒍ 2020. ᑕᖅᑭᑕᒫᑦ, ᒥᑭᓂᖅᐹᖅᑎᒍᑦ, ᐊᖏᓂᖅᐹᖅᑎᒍᓪᓗ ᐊᕐᕌᒍᑕᒫᕐᓗ ᓂᓪᓕᓇᕐᓂᖏᓐᓂ ᓇᓗᓇᐃᔭᖅᑐᒋᑦ, ᐊᒻᒪᓗ ᐃᔾᔪᓂᖏᑦ ᓴᖅᑭᖅᑕᐅᒍᒪᕐᒥᔪᑦ ᐅᖃᓕᒫᒐᓭᐅᓗᑎᒃ ᑕᐃᒃᑯᓄᖓ ᑎᒍᒥᐊᖅᑎᐅᖃᑕᐅᔪᓄᑦ. ᓄᓇᐅᑉ ᐃᑭᐊᖓᓂ ᖁᐊᑦ ᓄᐊᑕᐅᖃᑦᑕᖅᓯᒪᒻᒪᑕ 2017–ᒥᓂᑦ 2018–ᒥᓗ ᕿᒥᕐᕈᔭᐅᓪᓗᑎᑦ ᐃᓗᖏᑦ ᖃᐅᔨᓴᐅᑎᒧᑦ (CT-scanning) ᖃᐅᔨᒍᒪᑦᑎᐊᖅᑐᑎᒍ ᐃᑭᐊᖓᓃᑦᑐᑦ ᐊᒻᒪᓗ ᓄᓇᐅᑉ ᐃᑭᐊᖓᓂ ᖁᐊᖑᓚᐅᖅᓯᒪᔪᑦ ᓄᐊᑕᐅᑦᑎᐊᖅᑐᑎᑦ ᐱᑐᖃᕐᓂᑦ ᖃᐅᔨᓴᐅᑎᒥᓂᕐᓂᑦ ᐳᑐᖅᑕᐅᓯᒪᔫᓐᖓᖅᑐᓂᒃ ᐅᖅᓱᐊᓗᔾᔨᐅᖅᑎᓂᒃ ᒫᓯᓯᐅᖅᑎᓂᓪᓗ. ᑕᒪᒃᑯᐊ ᐊᑐᖅᑐᑎᒍ ᐊᖅᑭᔅᓱᐃᓯᒪᔪᒍᑦ ᐊᕙᑦᑐᖅᓯᒪᔪᓂᒃ ᐅᑭᐅᖅᑕᖅᑐᒥ ᓄᓇᐃᑦ ᖁᐊᖑᓂᖏᓐᓂ ᓄᓇᓐᖑᐊᓕᐅᖅᑐᑕ ᓇᐃᓈᖅᓯᒪᔪᓂᓪᓗ ᐅᓂᒃᑳᓕᐅᖅᑐᑕ ᓄᓇᐅᑉ ᐃᑭᐊᖏᓐᓂ ᖁᐊᕐᓂᑦ ᖃᐅᔨᒪᔪᓂᒃ ᑭᕙᓪᓕᕐᒥ.

Publications associated with NRI Scientific Research License 03 003 22R-M

Scientific Journal Papers

Oldenborger G.A., Short N., LeBlanc A.-M., 2020. Electrical conductivity and DInSAR ground displacement in permafrost terrain. Journal of Applied Geophysics 181, 104148. https://doi.org/10.1016/j.jappgeo.2020.104148

Oldenborger G.A., 2021. Subzero temperature dependence of electrical conductivity for permafrost geophysics. Cold Regions Science and Technology 182, 103214. https://doi.org/10.1016/j.coldregions.2020.103214

Oldenborger, G.A., Bellehumeur-Génier, O., LeBlanc, A.-M., McMartin, I., 2022. Landform mapping, elevation modelling, and thaw subsidence estimation for permafrost terrain using a consumer-grade remotely-piloted aircraft. Drone Systems and Applications 10, 309–329. https://doi.org/10.1139/dsa-2021-0045

Oldenborger, G.A., Short, N., LeBlanc, A.-M., 2022. Permafrost thaw sensitivity prediction using surficial geology, topography, and remote-sensing imagery: A data-driven neural network approach. Canadian Journal of Earth Sciences 59, 897–913. https://doi.org/10.1139/cjes-2021-0117

Departmental Reports

Oldenborger G.A., LeBlanc A.-M., Bellehumeur-Génier O., Grosset C., Holzman S., Masson C., 2016. Community workshop on permafrost and landscape change, Rankin Inlet, Nunavut. Geological Survey of Canada, Open File 8057. https://doi.org/10.4095/298806

Short N., LeBlanc A.-M., Bellehumeur-Génier O., 2016. Seasonal surface displacement derived from DInSAR, Rankin Inlet, Nunavut. Geological Survey of Canada, Canadian Geoscience Map 291. https://doi.org/10.4095/298815

Bellehumeur-Génier O., Oldenborger G.A., LeBlanc A.-M., 2017. Historical fluctuations of lake shorelines based on geomorphological analysis in the vicinity of Rankin Inlet, Nunavut. Geological Survey of Canada, Open File 8224. https://doi.org/10.4095/328869

Oldenborger G.A., Bellehumeur-Génier O., LeBlanc A.-M., Tremblay T. 2018. Performance analysis of RapidEye multi-spectral land cover mapping for the western coast of Hudson Bay, Nunavut. Geological Survey of Canada, Open File 8380. https://doi.org/10.4095/311216

Oldenborger G.A., Faucher B., LeBlanc A.-M., 2021. Multi-spectral permafrost terrain classification, Rankin Inlet, Nunavut. Geological Survey of Canada, Open File 8824. https://doi.org/10.4095/328869

Special Publications

Tremblay T., Kendall M.S., LeBlanc A.M., Short N., Bellehumeur-Génier O., Oldenborger G.A., Budkewitsch P., Mate D.J., 2015. Overview of the surficial geology map compilation, RapidEye land-cover mapping and permafrost studies for infrastructure in the western Hudson Bay area, Nunavut. Canada-Nunavut Geoscience Office, Summary of Activities 2015, 145–160. https://cngo.ca/summary-of-activities/2015/

LeBlanc A.-M., Bellehumeur-Génier O., Oldenborger G.A., Tremblay T., 2016. Understanding permafrost conditions through integration of local and traditional observations with geoscience data in the region of Rankin Inlet, Nunavut. Canada-Nunavut Geoscience Office, Summary of Activities 2016, 75–88. https://cngo.ca/summary-of-activities/2016/

Oldenborger G.A., Bellehumeur-Génier O., Tremblay T., Calmels F., LeBlanc A.-M., 2016. Permafrost studies in the Rankin Inlet and Ennadai Lake areas, southern Nunavut. Canada-Nunavut Geoscience Office, Summary of Activities 2016, 67–74. https://cngo.ca/summary-of-activities/2016/

Oldenborger G.A., Bellehumeur-Génier O., Tremblay T., LeBlanc A.-M., 2017. Ground temperatures and permafrost conditions, Rankin Inlet, Nunavut. Canada-Nunavut Geoscience Office, Summary of Activities 2017, 117–128. https://cngo.ca/summary-of-activities/2017/

Oldenborger G.A., Bellehumeur-Génier O., LeBlanc A.-M., 2018. Performance of a consumer-grade unmanned aerial vehicle for acquisition of imagery and creation of digital elevation models and ground displacement maps in permafrost terrain, Rankin Inlet area, southern Nunavut. Canada-Nunavut Geoscience Office, Summary of Activities 2018, 153–166. https://cngo.ca/summary-of-activities/2018/

LeBlanc A.-M., Bellehumeur-Génier O., Oldenborger G.A., Short N., 2020. Lake area and shoreline changes due to climate and permafrost-related drivers, Rankin Inlet area, Nunavut. Canada-Nunavut Geoscience Office, Summary of Activities 2019, 79–92. https://cngo.ca/summary-of-activities/2019/

LeBlanc A.-M., Oldenborger G.A., 2021. Ground temperature, active layer thickness and ground ice conditions in the vicinity of Rankin Inlet, Nunavut. Canada-Nunavut Geoscience Office, Summary of Activities 2020, 63–72. https://cngo.ca/summary-of-activities/2020/

Conference Proceedings

LeBlanc A.-M., Oldenborger G.A., Bellehumeur-Génier O., 2017. Local and traditional knowledge in conjunction with geoscience data to understand permafrost conditions and guide research activities, Rankin Inlet, Nunavut. ArcticNet Annual Scientific Meeting, Quebec, QC, 285–286.

Tremblay T., Oldenborger G.A., Bellehumeur-Génier O., Short N., Leblanc A.-M., 2017. Surficial sediments, land cover mapping and permafrost characteristics in the Western Hudson

Bay area, Nunavut. Yellowknife Geoscience Forum, Yellowknife, NWT, 115.

Oldenborger G.A., Short N., LeBlanc A.-M., 2018. Comparison of apparent conductivity to ground displacement and surficial geology for continuous permafrost. European Meeting of Environmental and Engineering Geophysics, Porto, Portugal, Tu 24A 04. https://doi.org/10.3997/2214-4609.201802515

LeBlanc A.-M., Bellehumeur-Génier O., Oldenborger G.A., 2018. Lake shoreline evolution and permafrost-related drivers, Rankin Inlet, Nunavut. ArcticNet Annual Scientific Meeting, Ottawa, ON.

LeBlanc A.-M., Oldenborger G., Short N., 2019. Comparison between seasonal and inter-annual ground surface displacements based on surficial geology to assess permafrost conditions, Rankin Inlet, Nunavut. Canadian Permafrost Conference, Québec, QC. https://doi.org/10.1061/9780784482599.071