

Media Backgrounder: Permafrost Institute, YukonU Research Centre

Quick Facts:

- Permafrost is any soil, rock, or sediment that remains at, or below, 0°C for two or more consecutive years.
- Permafrost can contain large volumes of pure ice. As permafrost warms, this ice can melt – causing tremendous change to landscapes and damaging infrastructure as a result.
- Permafrost is extremely widespread; it underlies one third of the global Arctic land mass and half of the Canadian land mass.
- While northern communities are “used to” living with permafrost, the additional information provided by permafrost researchers helps to identify vulnerable areas and gives decision-makers critical information about what will happen as permafrost thaws.
- Our permafrost team is working with governments, communities and industry to solve northern problems with northern solutions by northern experts.

YukonU's [Research Chair in Permafrost and Geoscience](#), Dr. [Fabrice Calmels](#), is supporting research activity across northern Canada as the principle, and network investigator for the ArcticNet-funded research program, [Supporting humans in a thawing landscape](#). Collaborative research activities in this program are taking place in Nunavik (Quebec), Nunavut, Northern Ontario, Northern Manitoba, Northwest Territories, and Yukon, and in partnership with Laval University and University of Alberta researchers. Dr. Calmels and his team are also working on two additional research projects in Yukon: a highway alarm system for thawing permafrost, and a community risk assessment in the Traditional Territory of the Champagne and Aishihik First Nations.

Featured research activity:

Highway alarm system for thawing permafrost

Yukon communities rely heavily on highways as their lifeline for food and supplies, and to support economic development and tourism. Our highways connect us to other provinces and territories and to the U.S., but they are built over hundreds of kilometers of permafrost that is thawing in response to climate change. The resulting damage to these roads has implications for many northern residents – from safety hazards, road closures and travel delays, to increased maintenance and engineering expenses.

YukonU's Permafrost Institute is monitoring a [permafrost slump](#) that is migrating towards the Alaska Highway at a rate of 12 metres per year. The research team is developing an alarm system in partnership with Yukon Highways and Public Works, Laval University, and Transport Canada's Northern Transportation Adaptation Initiative, to alert to emerging risks associated with the slump. This alarm will be applied to two locations of concern in Yukon. This technology could be applied in locations across Canada's North to monitor other similar areas of risk.



Permafrost thaw and northern ways of life

Old Crow is located in one of the fastest warming regions in Canada and home to the Vuntut Gwitchin First Nation (VGFN). The Vuntut Gwitchin are concerned with how climate change is impacting their way of life. The harvest of fish, plants, and caribou are impacted by thawing permafrost; lakes are draining, riverbanks are eroding, and changing vegetation challenges both the people, and the animals upon which they depend. Vuntut Gwitchin Government is working with researchers, including YukonU's Permafrost Institute, to assess the vulnerability of their traditional territory to permafrost thaw, and to support their community-based permafrost monitoring program. Community involvement in all stages of the research is a priority for Vuntut Gwitchin Government and the research team.

This project provides information about the sensitivity of culturally important areas to permafrost thaw, impacts on water quality, and changes in hydrology. YukonU researchers have developed a story map entitled, [Climate Change Impacts in the Vuntut Gwitchin Traditional Territory](#), that shows these sites, some of the landscape changes observed by VGFN's community members, and the research completed by our experts. YukonU researchers use an all-inclusive approach combining indigenous knowledge of the land with western science to develop the most comprehensive understanding of the evolution of this very complex and vulnerable landscape.

This is a collaborative project with the Vuntut Gwitchin Government, Brock University, Parks Canada – Yukon Region, and Laval University. Polar Knowledge Canada and ArcticNet helped fund this project with supplementary funding from Government of Canada's Climate Change Awareness in the North Program.



Photo caption: Heavy rains in the Old Crow Flats eroded the channel that connects the lake on the left to the lake on the right. Described as “catastrophic drainage”, this event dramatically altered the landscape and impacted traditional use of the land in this area.