



Permafrost Science Workshop

Permafrost Geotechnique

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Workshop on State of the Science at ESS



Natural Resources
Canada

Ressources naturelles
Canada

Canada

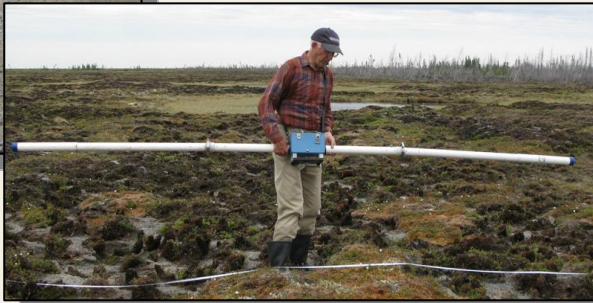


What is permafrost geotechnique and how do we investigate it?

Sub-surface investigation



Ground surface geophysics



Monitoring wells



In-situ testing



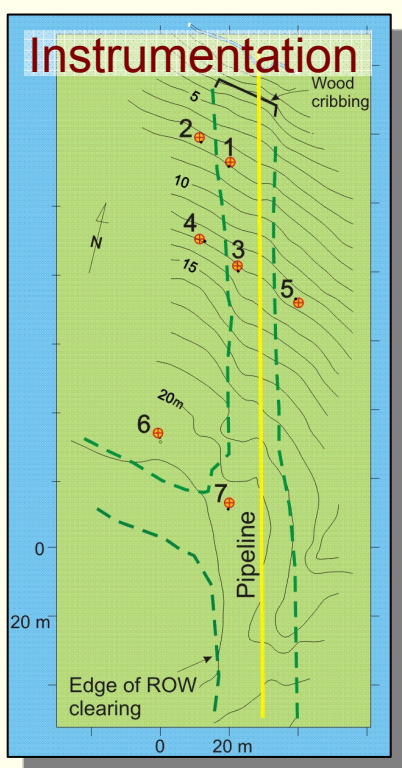
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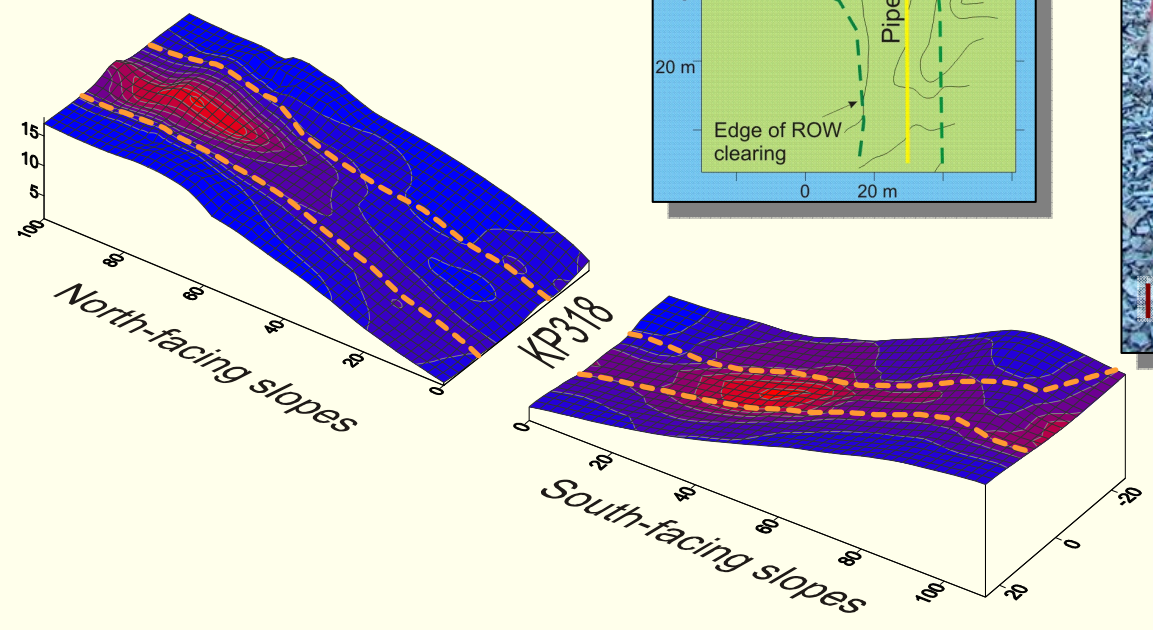


Application

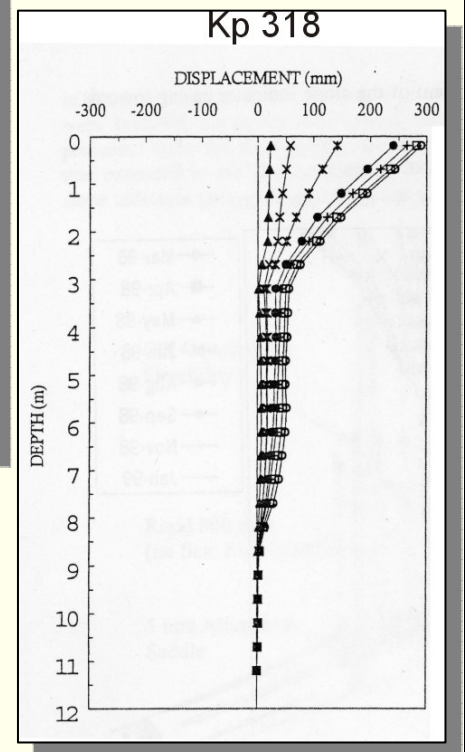
Understanding slope processes
for engineering design & environmental protection



Thaw depths determined by
EM and thermistor data



Movement record



Application

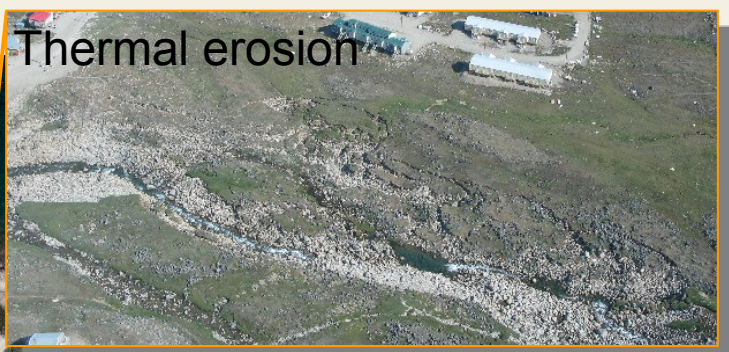
Assessing permafrost sensitivity for land use planning



Thaw settlement



Thermal erosion



Pangnirtung



infrastructure risk



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Scientific Contribution

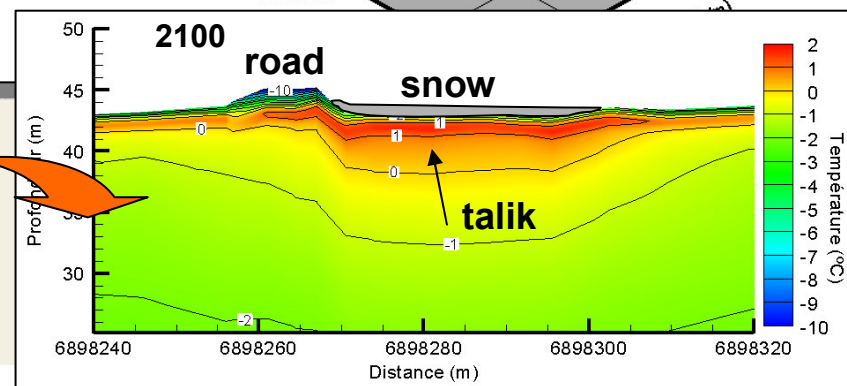
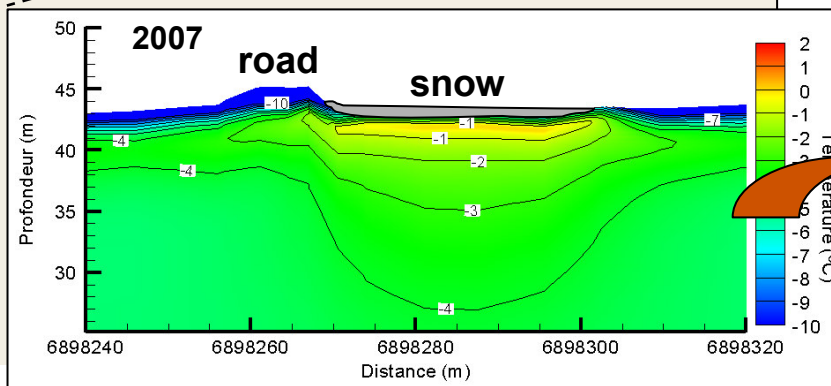
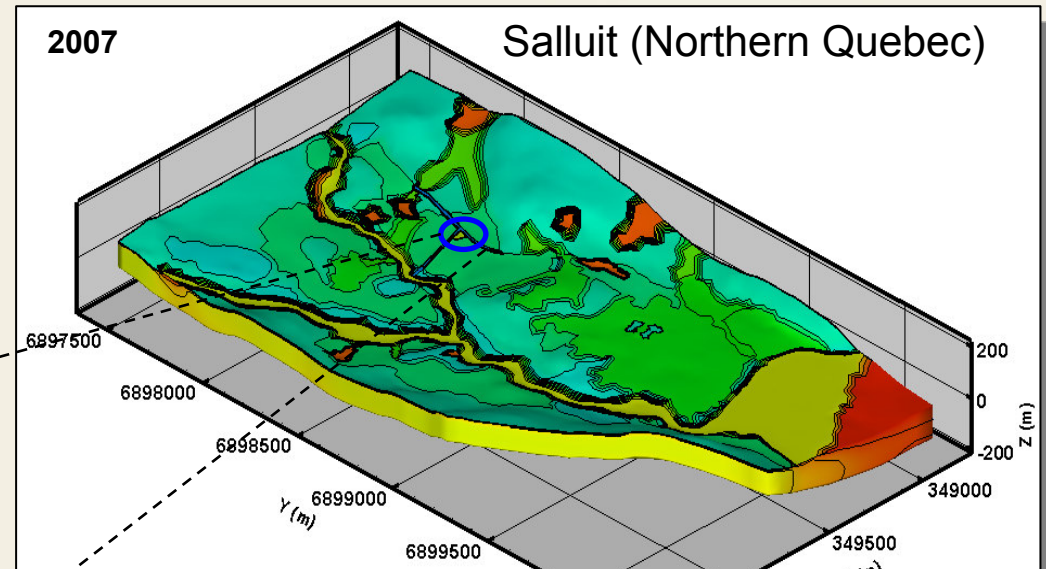
Assessment of climate change impacts

Applied permafrost geotechnique investigation

- Drilling and sampling
- Thermal and physical properties
- Shallow geophysics
- Thermistor cables



Community-based thermal model



Scientific Contribution

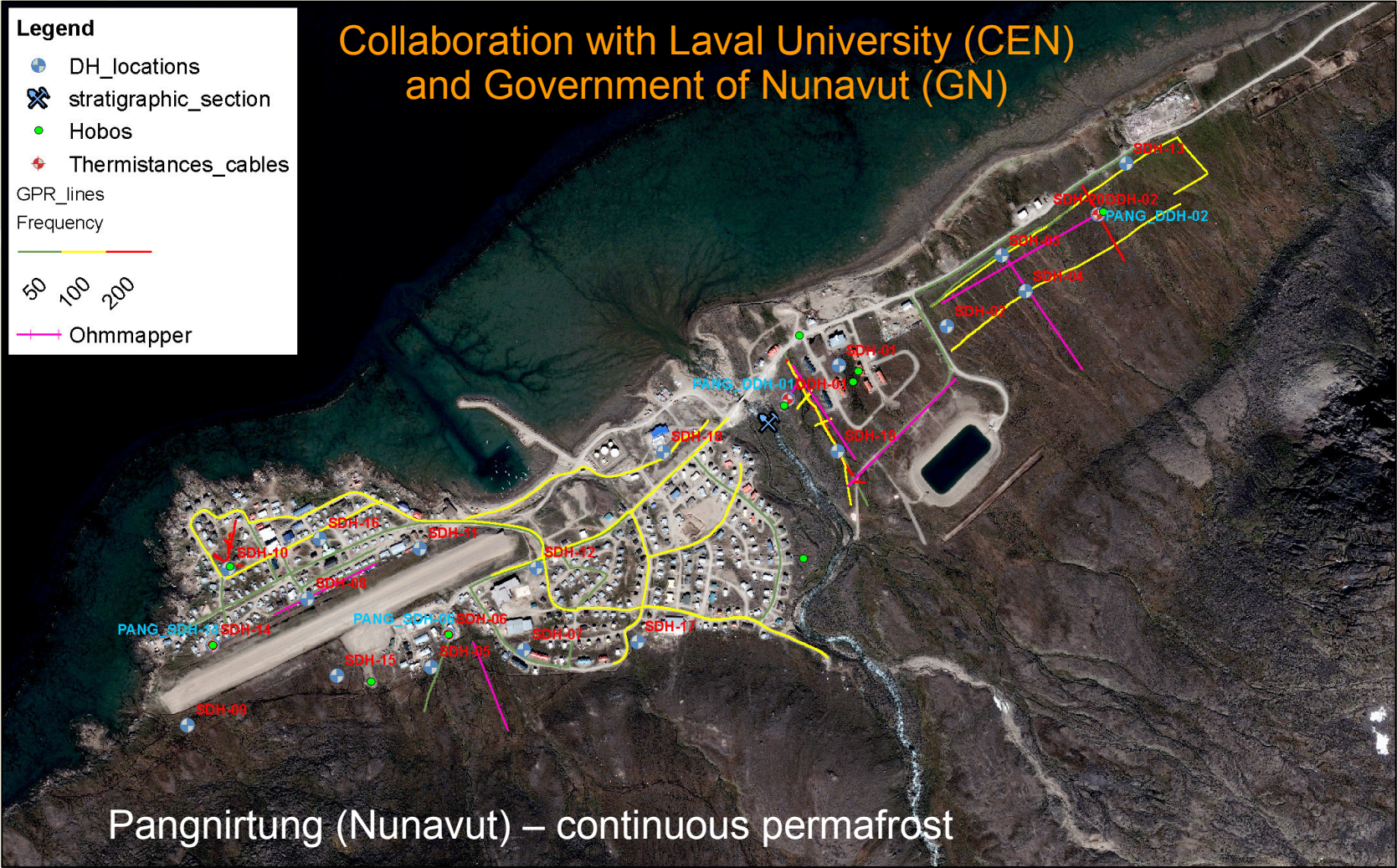
Nunavut Landscape Hazard Mapping Project



Legend

- DH_locations
- stratigraphic_section
- Hobos
- Thermistances_cables
- GPR_lines
- Frequency
- 50 100 200
- Ohmmapper

Collaboration with Laval University (CEN) and Government of Nunavut (GN)



Pangnirtung (Nunavut) – continuous permafrost



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Activities



Thawing slope processes

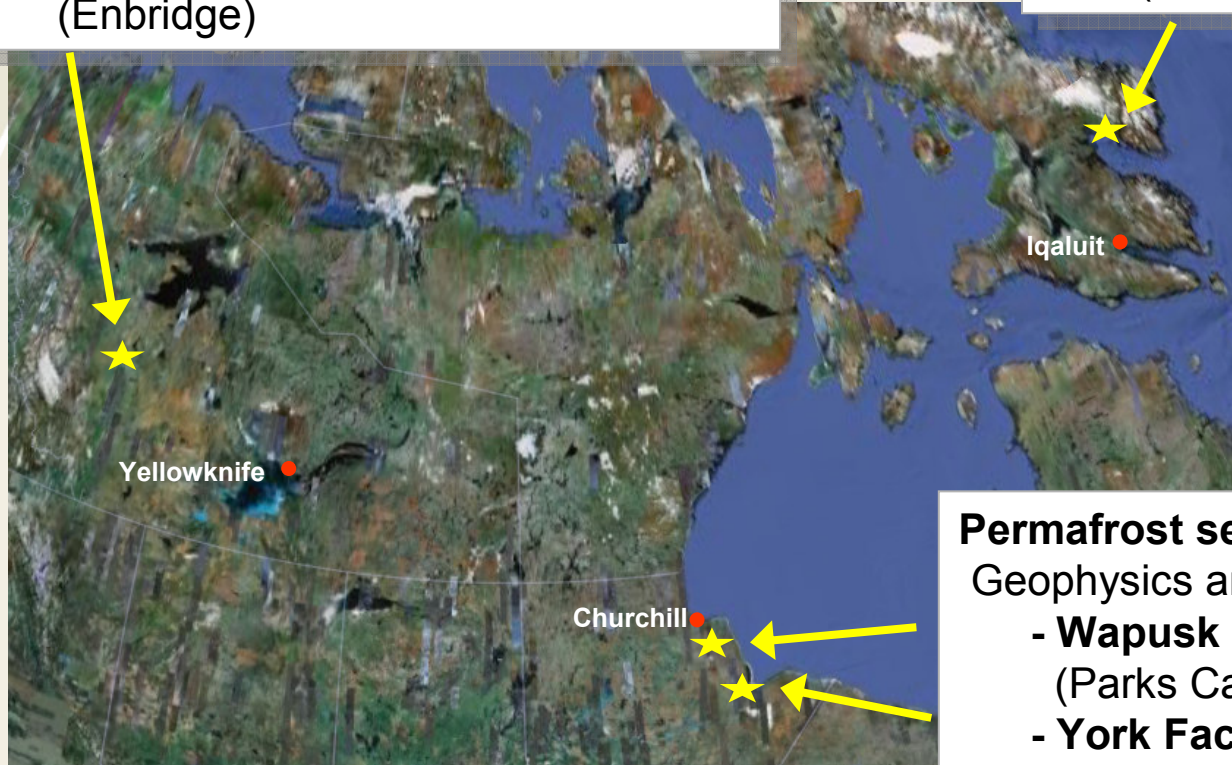
Geophysics, inclinometers, thermistors

- **Wrigley (KP313)**
(Enbridge)
- **Steep Creek (KP194)**
(Enbridge)

Community climate change hazard maps

Geophysics, soils testing, thermistors

- **Pangnirtung**
(U Laval, Nunavut Gov't)



Permafrost sensitivity characterisation

Geophysics and thermal monitoring

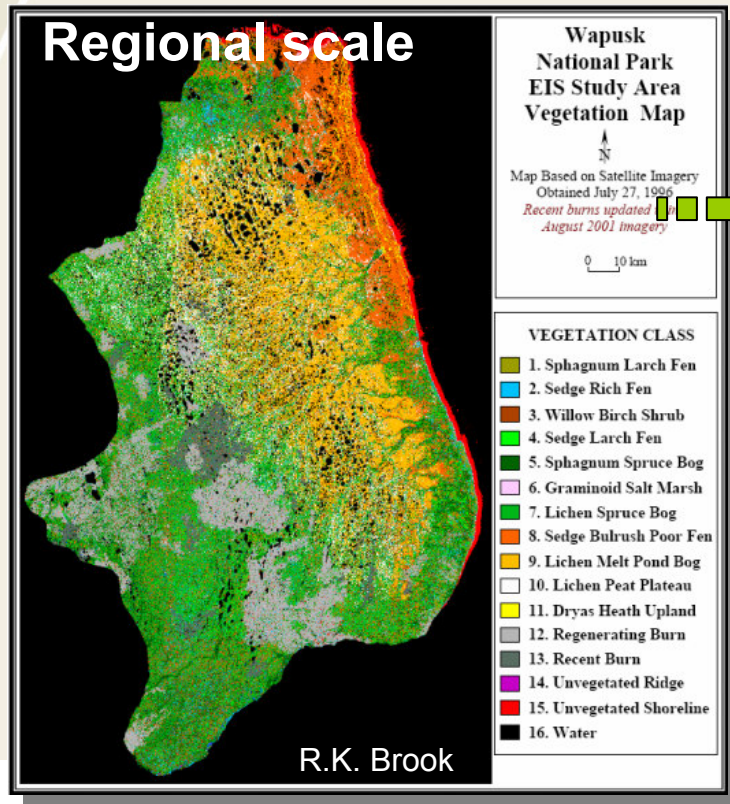
- **Wapusk National Park**
(Parks Canada, CCRS, U of A)
- **York Factory National Historic Site**
(Parks Canada)



Scientific Challenges and Gaps



- In-situ characterisation of warm permafrost properties
- Interpolation of point information in space and time to better qualify/quantify the permafrost sensitivity to anthropogenic and climate changes at a local scale:



- Snow cover thickness
- Vegetation cover
- Surface temperatures

