Permafrost Geotechnique

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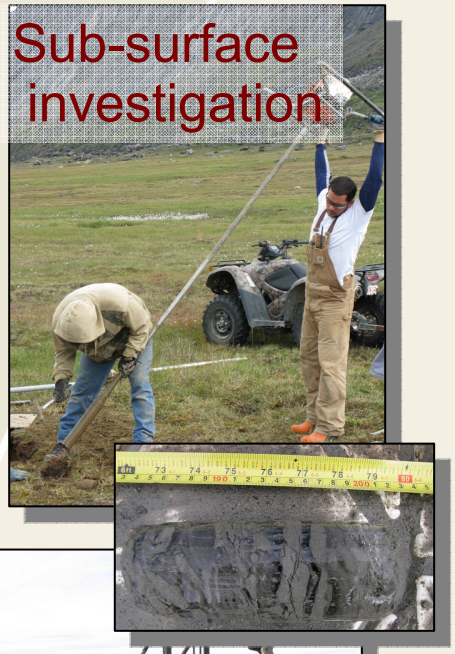
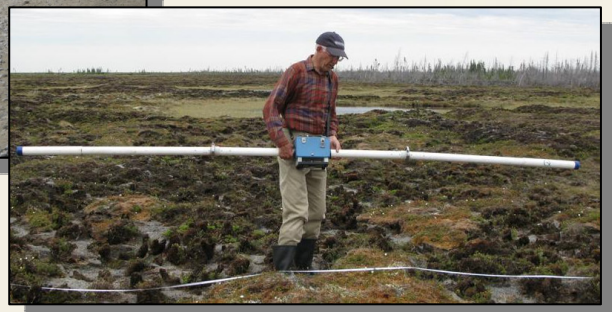
Workshop on State of the Science at ESS

What is permafrost geotechnique and how do we investigate it?

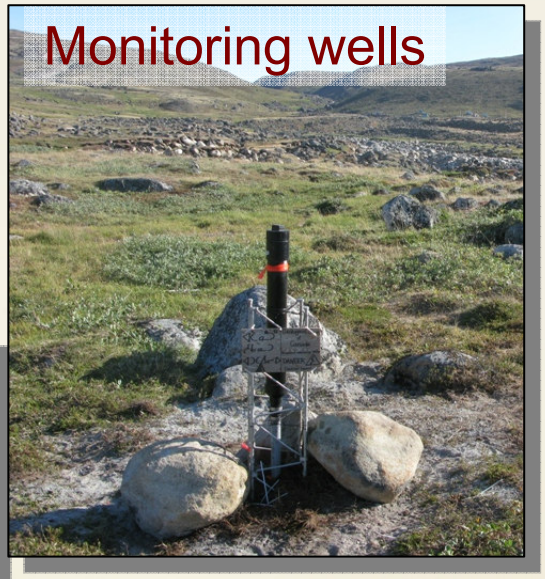
Sub-surface investigation



Ground surface geophysics



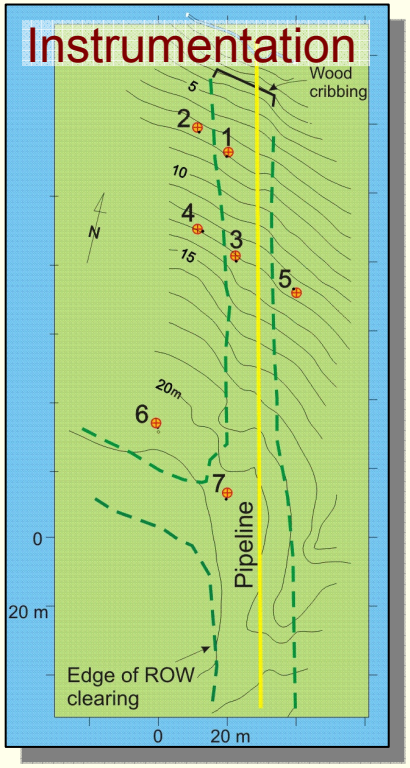
Monitoring wells



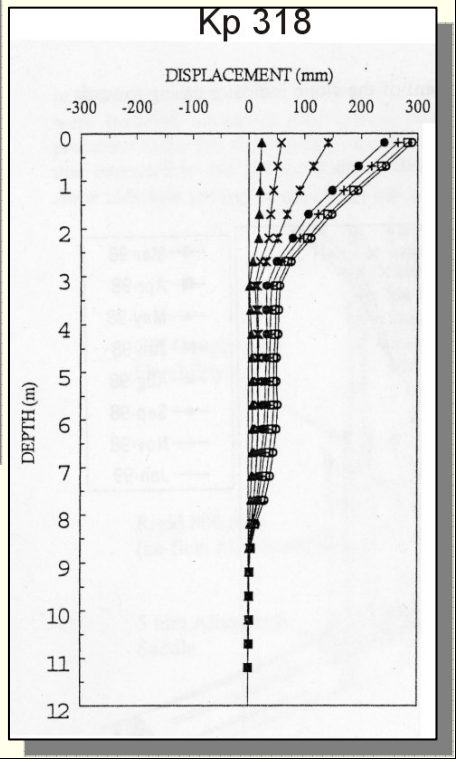
In-situ testing

Application

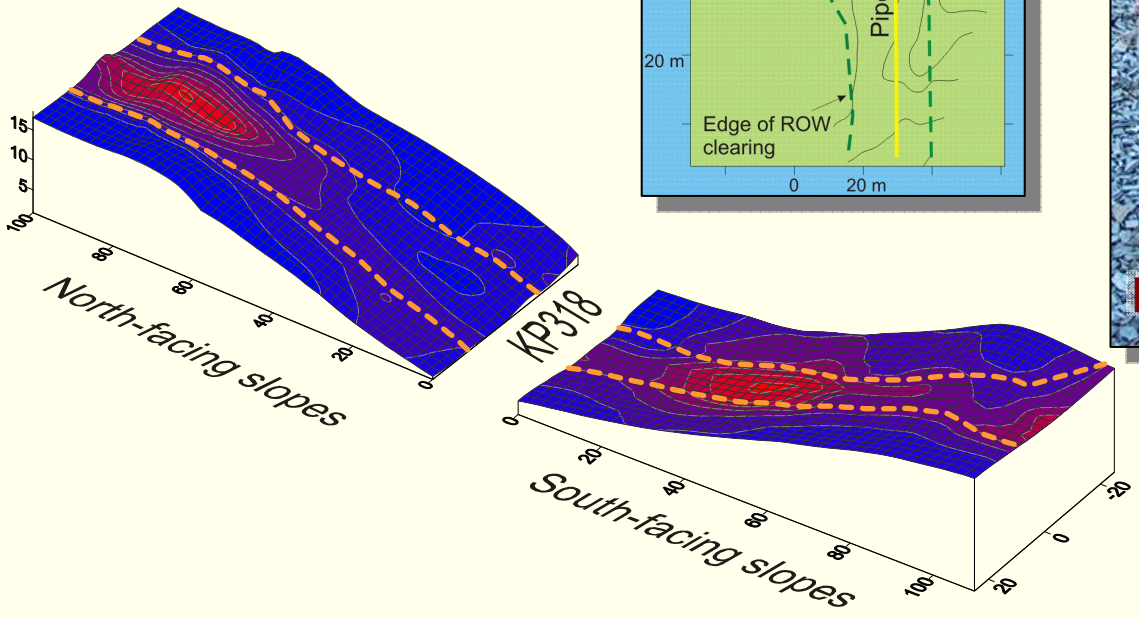
Understanding slope processes for engineering design & environmental protection



Movement record



Thaw depths determined by EM and thermistor data



Application

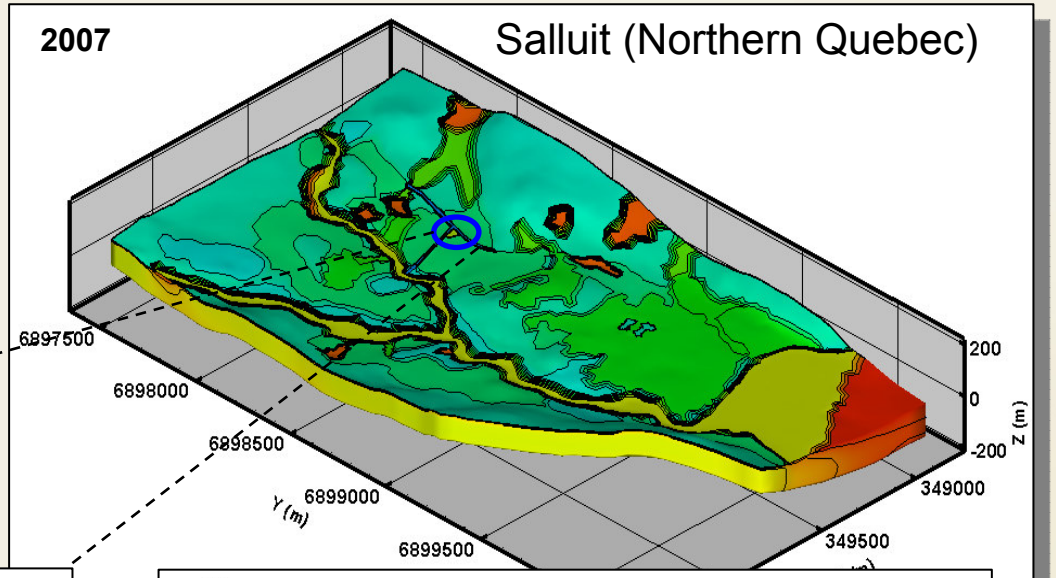
Assessing permafrost sensitivity for land use planning

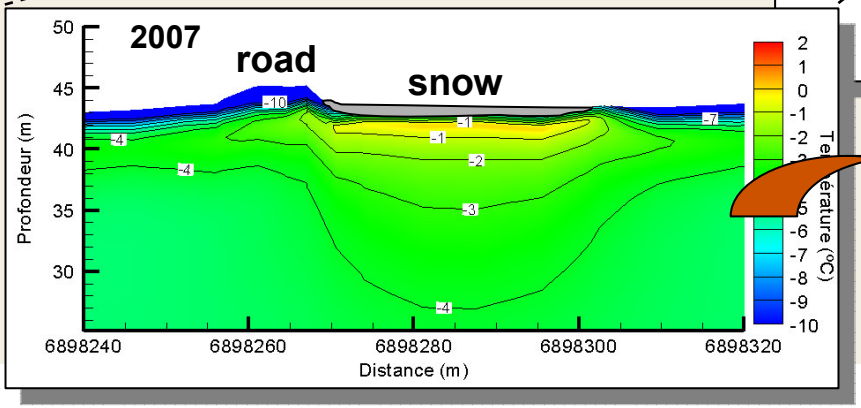
Scientific Contribution

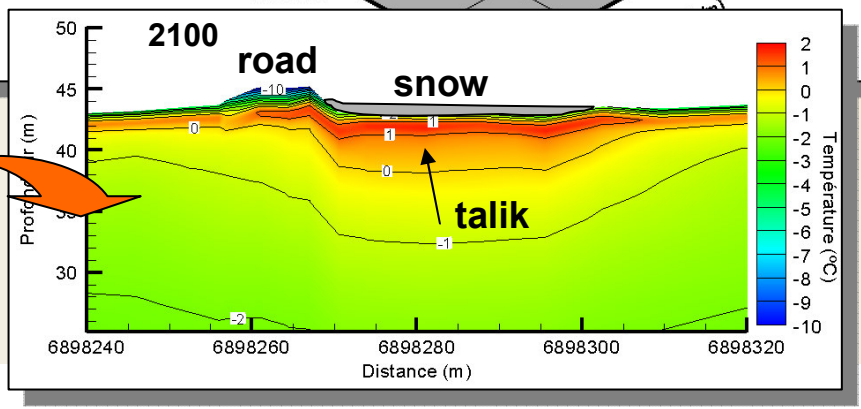
Assessment of climate change impacts

Applied permafrost geotechnique investigation → Community-based thermal model

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

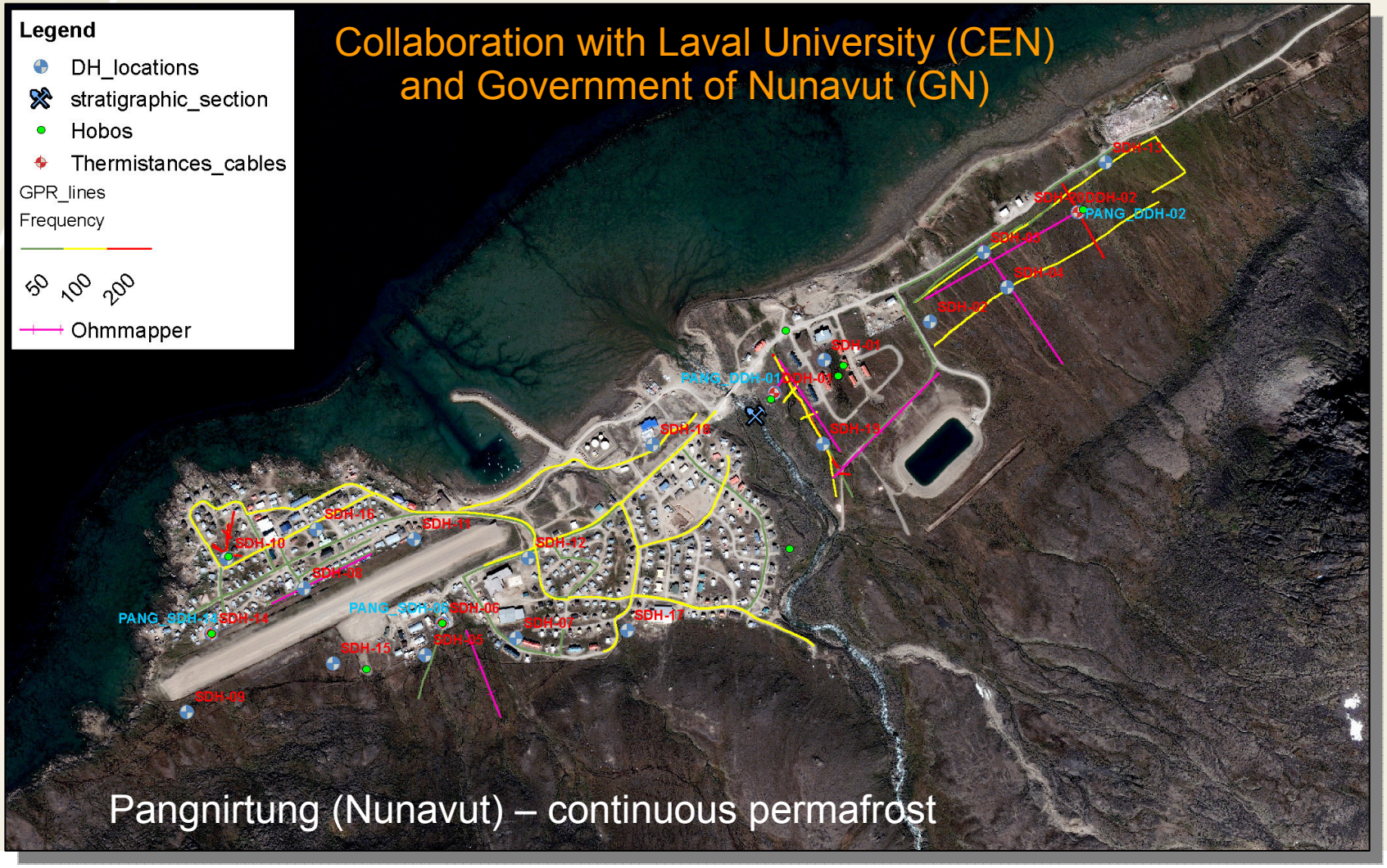






Scientific Contribution

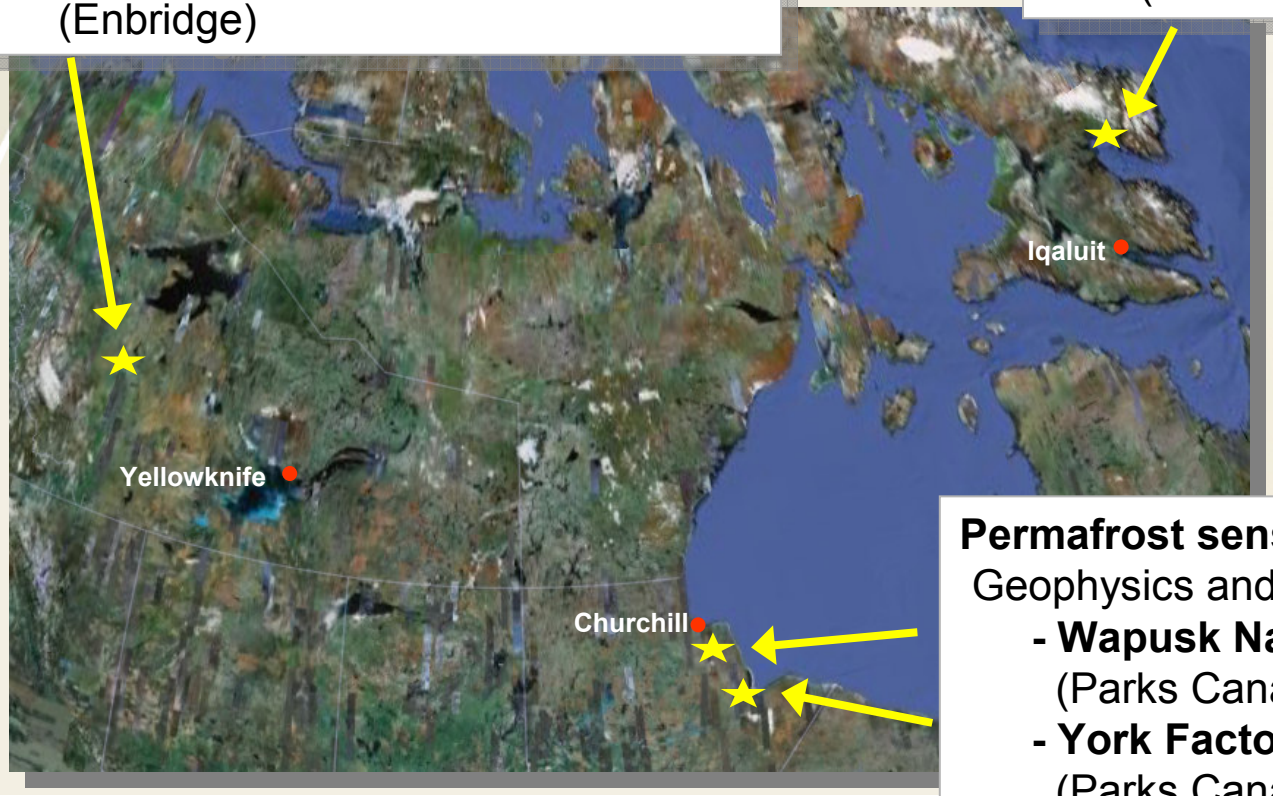
Nunavut Landscape Hazard Mapping Project



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)

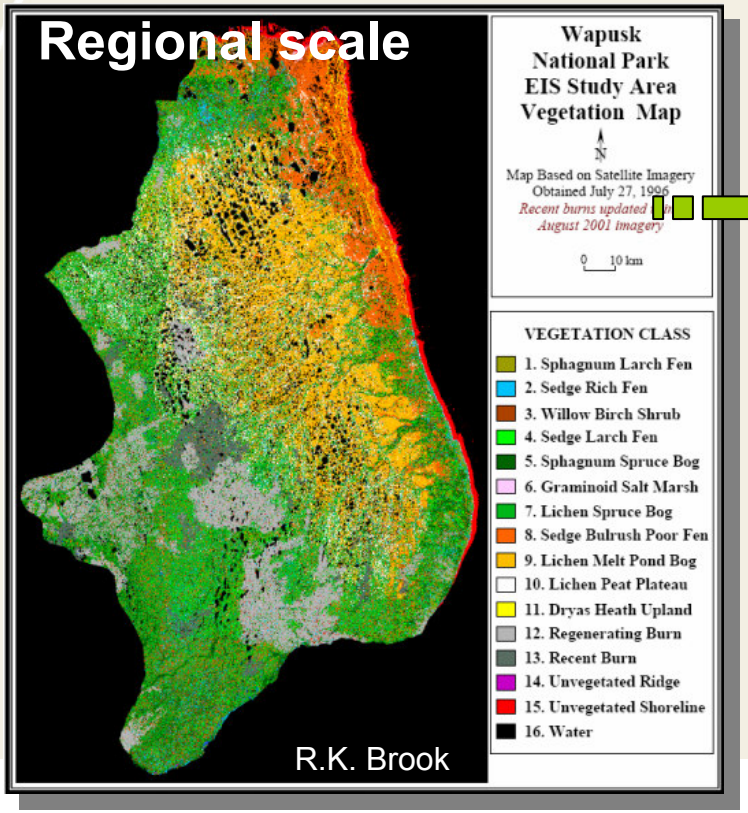


Permafrost sensitivity characterisation
Geophysics and thermal monitoring
- **Wapusk National Park**
  (Parks Canada, CCRS, U of A)
- **York Factory National Historic Site**
  (Parks Canada)

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