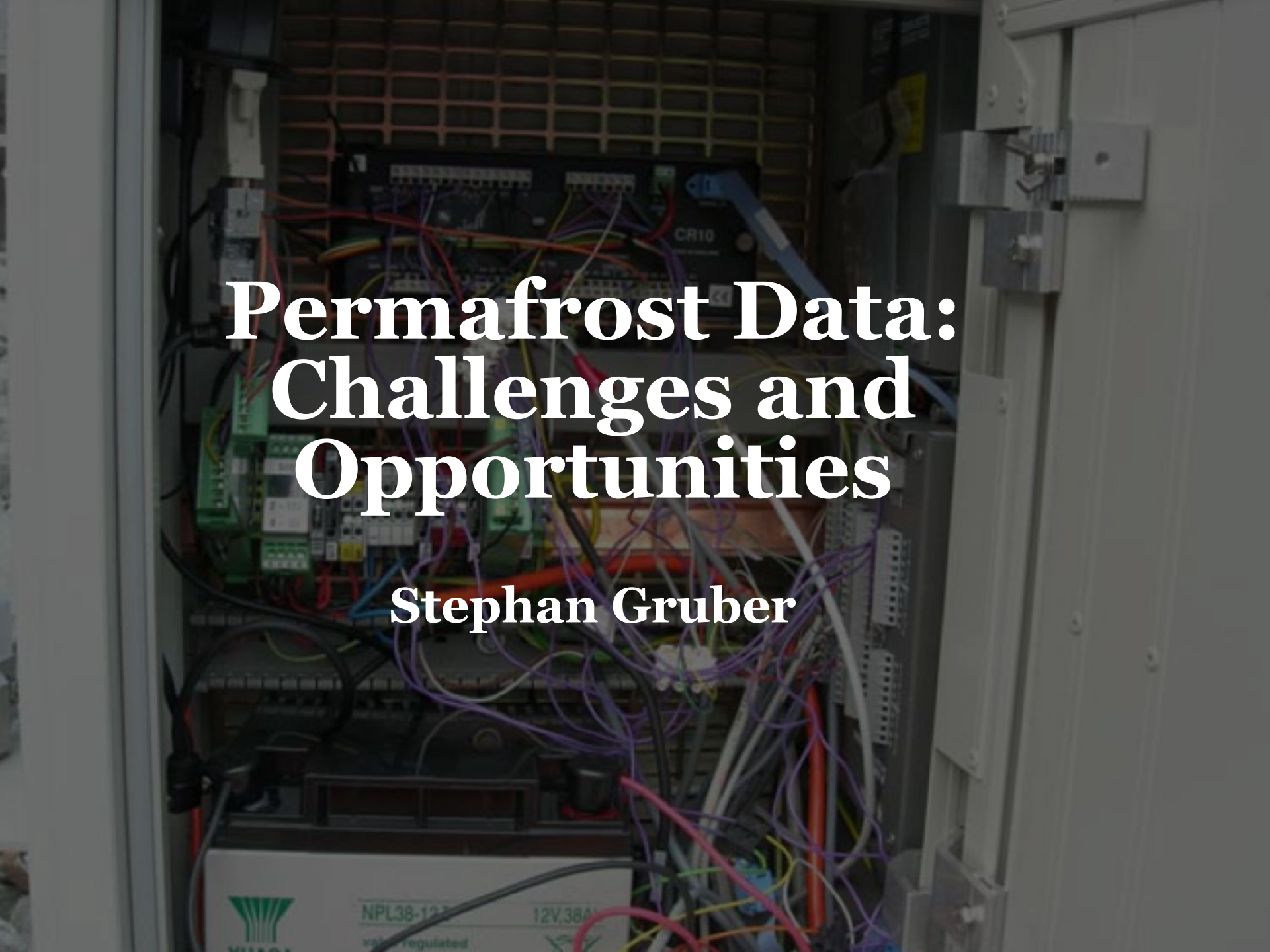
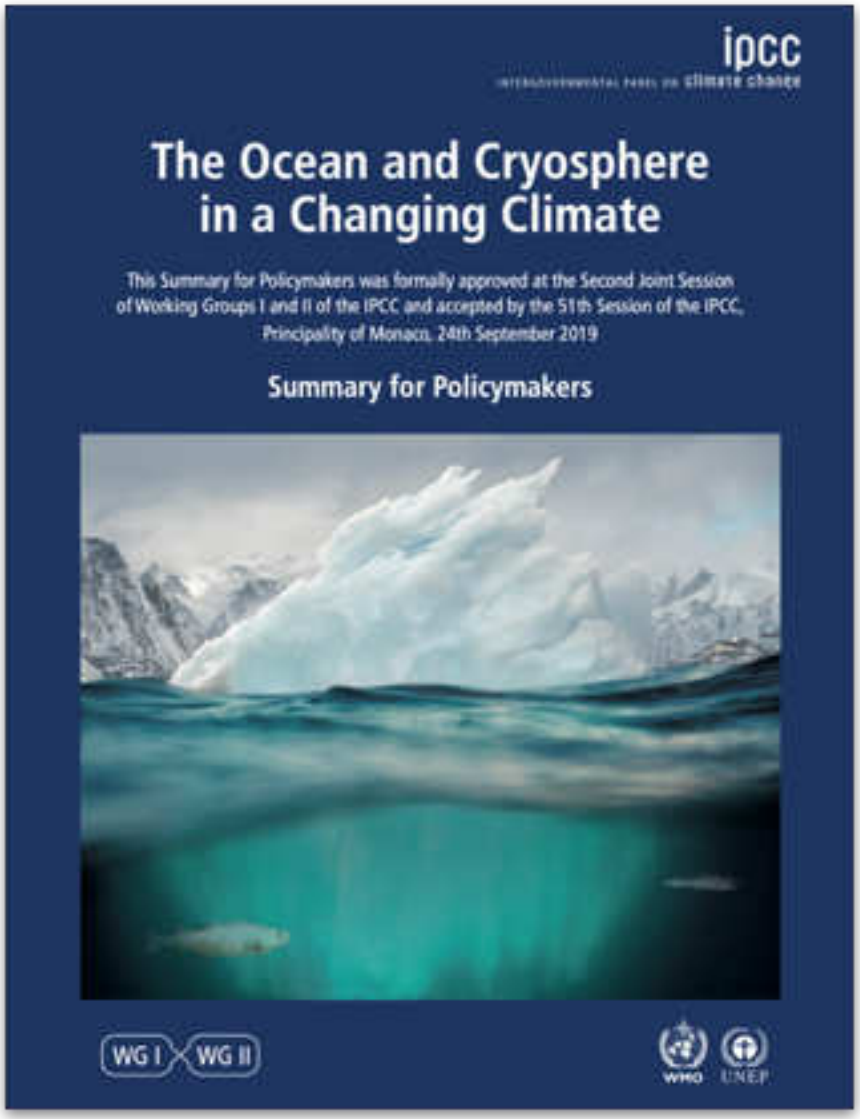


Permafrost Data: Challenges and Opportunities

Stephan Gruber

IPCC SROCC: Summary for Policymakers



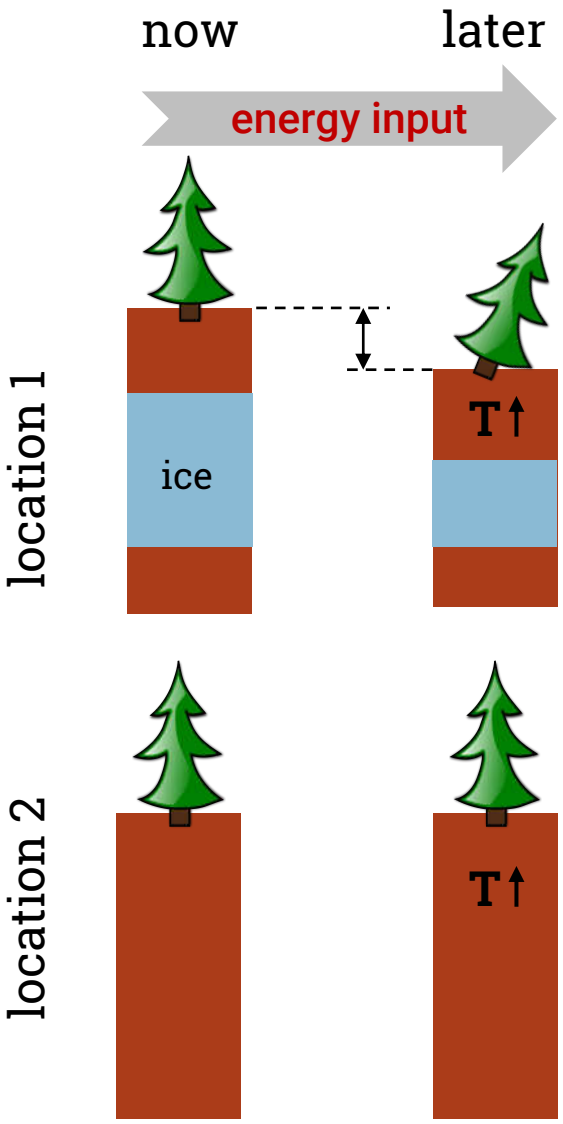
Projected changes and risks

- Widespread permafrost thaw is projected for **this century and beyond**.
- Disaster risks are expected to increase due to future changes in **hazards** and increased **exposure**.
- Current engineered risk reduction approaches are projected to be **less effective as hazards change** in character.

Implementing responses

- Climate change impacts operate longer time horizons than governance arrangements. Such **temporal differences challenge the ability of societies to adequately prepare.**
- **Monitoring and forecasting** inform adaptation planning, implementation, and robust decisions.

The permafrost-thaw hazard machine



Permafrost can turn energy input into hazards via temperature increase and ground-ice loss

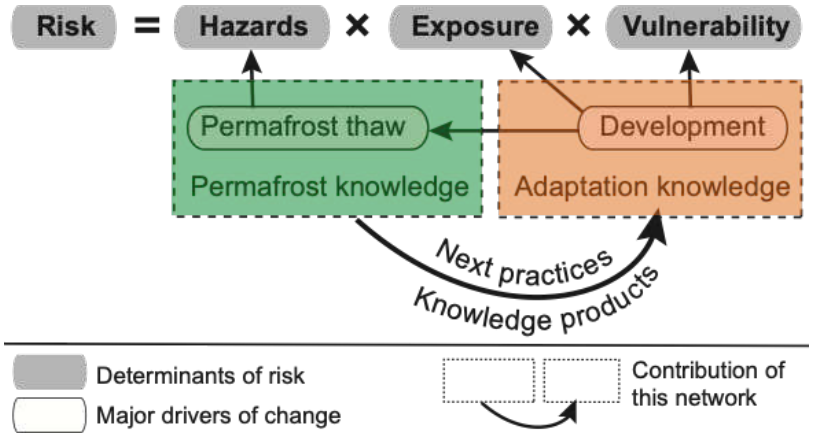
- The simple physical system is our opportunity for prediction.
- Key variables (ice content, temperature) cannot be observed remotely.
- Data for these key variables is required for prediction and hypothesis testing.
  - Local or regional hazard zonation maps
  - Data products derived from remote sensing
  - Comparing model performance
- Practical application of simulation results about future hazards needs performance criteria that include these key variables.

NSERC PermafrostNet Goal and objectives

PermafrostNet's goal is to boost Canada's ability to adapt to permafrost thaw.

Objectives

1. Quantify and predict permafrost thaw
2. Connect spatial scales
3. Prototype data & knowledge products



NSERC PermafrostNet is a Strategic Partnership Network

2019–2024, funded via NSERC, universities and partners

Critical mass, diversity, governance

- 12 Canadian universities
- 41 partner organizations from academia, Indigenous organizations, territorial/federal/provincial governments, industry, international
- 47 co-investigators and collaborators
- 60 trainees (PhD, MSc, PDF, northern research assistants)
- Governance with strong representation of stakeholders
- Partnership with the Canadian Consortium for Arctic Data Interoperability (CCADI)

➔ Good ingredients to make robust progress

Focused and connected

Many types of permafrost data: foundational first

- Ground temperature
- Basic geotechnical data (ice content)

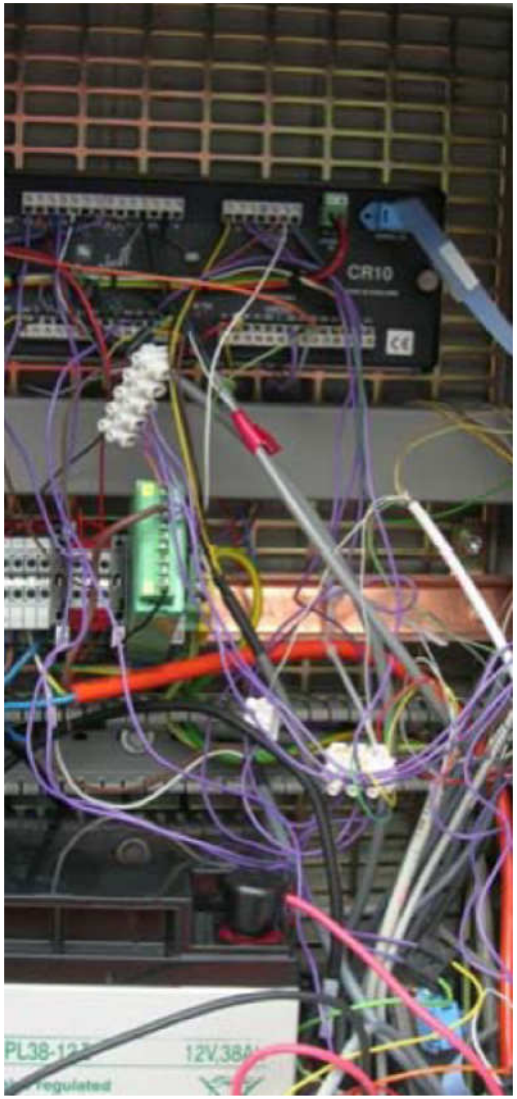
International issue: first get own house in order

- Learn from others
- Progress together to converge over time

Consider permafrost data inside bigger ‘ecosystem’

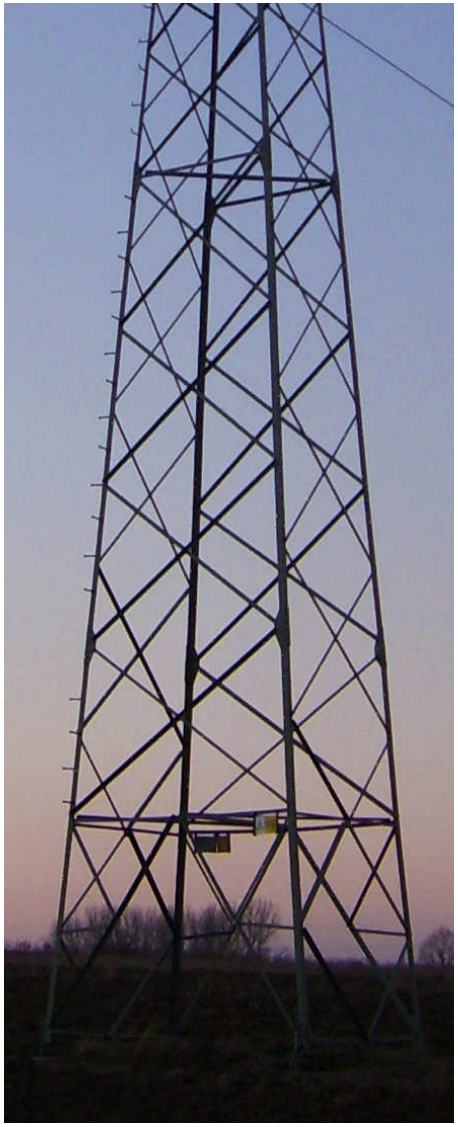
- Networked Artic research and data management
- Global Climate Observing System
- Permafrost observation and simulation strategy
- Climate Services
- …

Challenges – a start



- Data on key variables is rare and often very difficult to access.
- Lasting progress likely beyond single institutions – and most are shamefully under-resourced for this task.
- Reward systems favour individual and fast success.
- Field geocryology has diverse traditions and practices; data management is rarely well established in research and training
- Contributing to centralized databases can be annoying and ineffective
- Getting things done under COVID-19
- …
- …

Opportunities – a start



- Economies of scale in data management
- Complementary roles of differing sectors
- A lot of data exists and may be accessed (if it can be discovered)
- Making better data management attractive
  - Tools that add value
  - Interoperability
  - Support and service
  - Reliable rules and credit
- Underpinning progress in the long-term
- Getting things done under COVID-19
- …
- …
- …