Usefulness of a 3D geomodel of Canada from a stakeholder perspective

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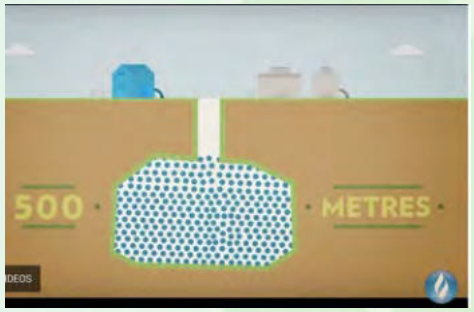
The Thread

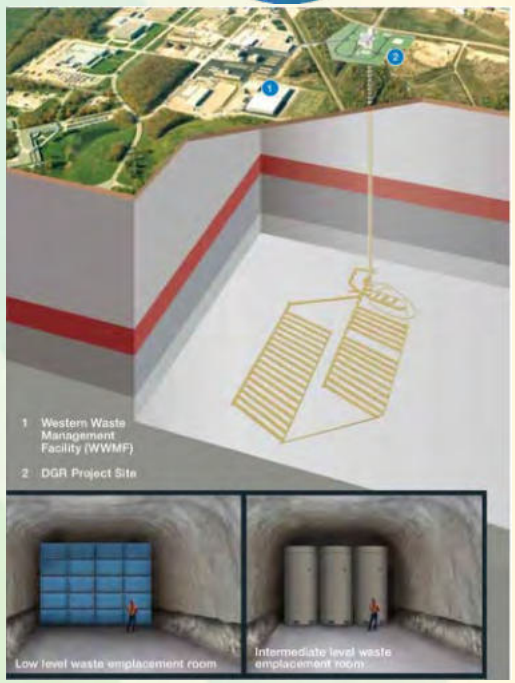
- Background on Canada
- Canada 3D and Canada1Water
- Canada 3D Overview
- Users
- Modelling vs data curation
- National harmonization
- Clients– six examples

Socio-Economic Issues (S-ON)

- Urban growth (30% population)
- Mining – salt, aggregate
- Petroleum – oil and gas, unconventional?
- Gas in transient storage (~$ 2 billion)
- Geothermal -shallow low temperature
- Disposal – municipal – deep injection
- Nuclear energy and waste disposal
- Potable water / irrigation
- Agricultural (25% Canadian; $ 35 billion)
- Ecological sustainability















Canadian Reality

- Federal state
- Divided responsibilities
- Natural resources provincial responsibility
  - Petroleum
  - Minerals
  - Water

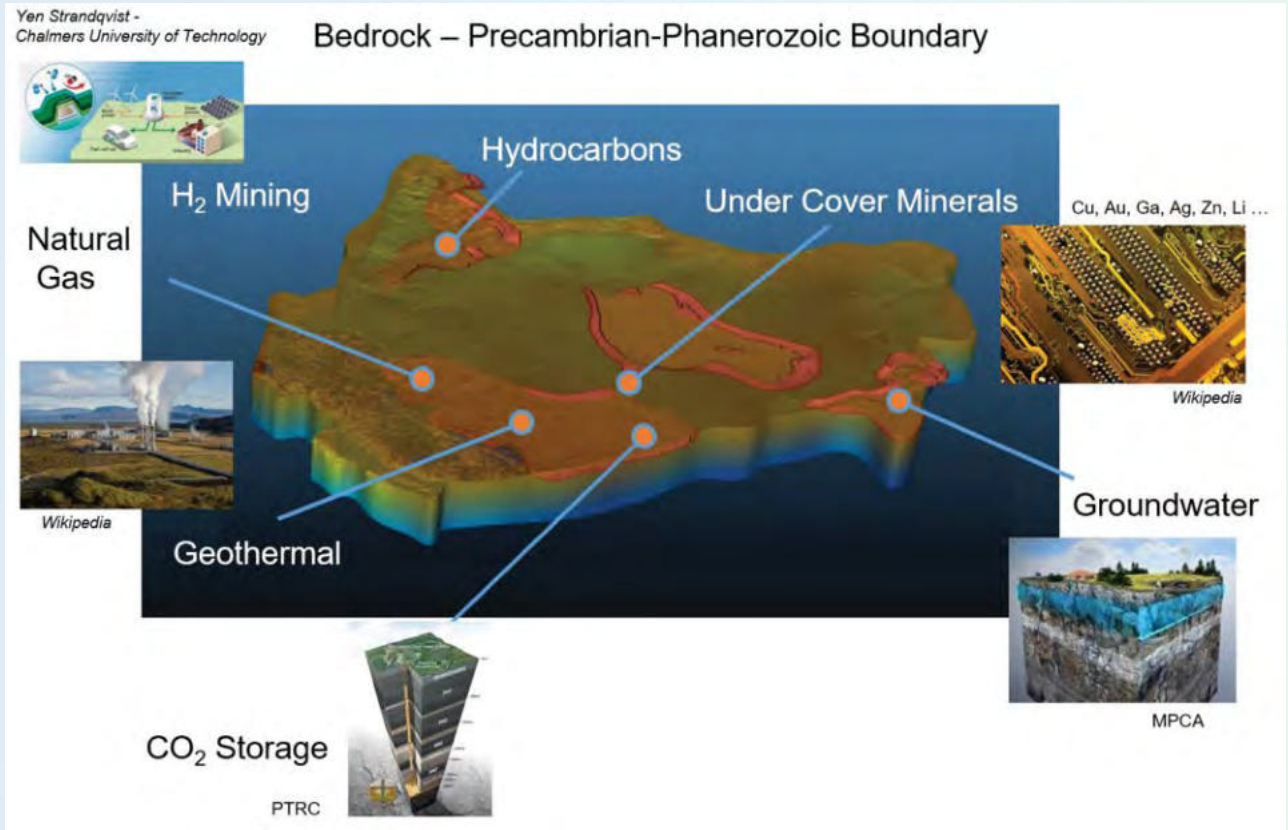


Scale Challenge

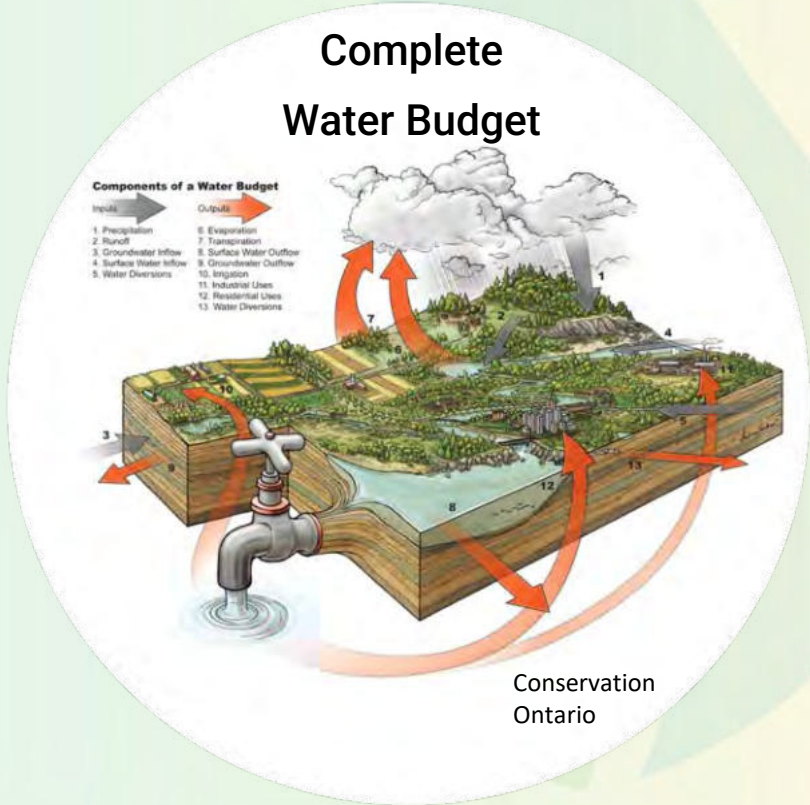


- Area: It is large: 9,984,670 km
- Population: low 41,798,407
- Distribution: heterogeneous population
- Economy: diverse
- Climate: temperate to polar
- Geographic: diversity and fragmentation
- Geological:
- Hydrological /Ecological
- Jurisdictional diversity

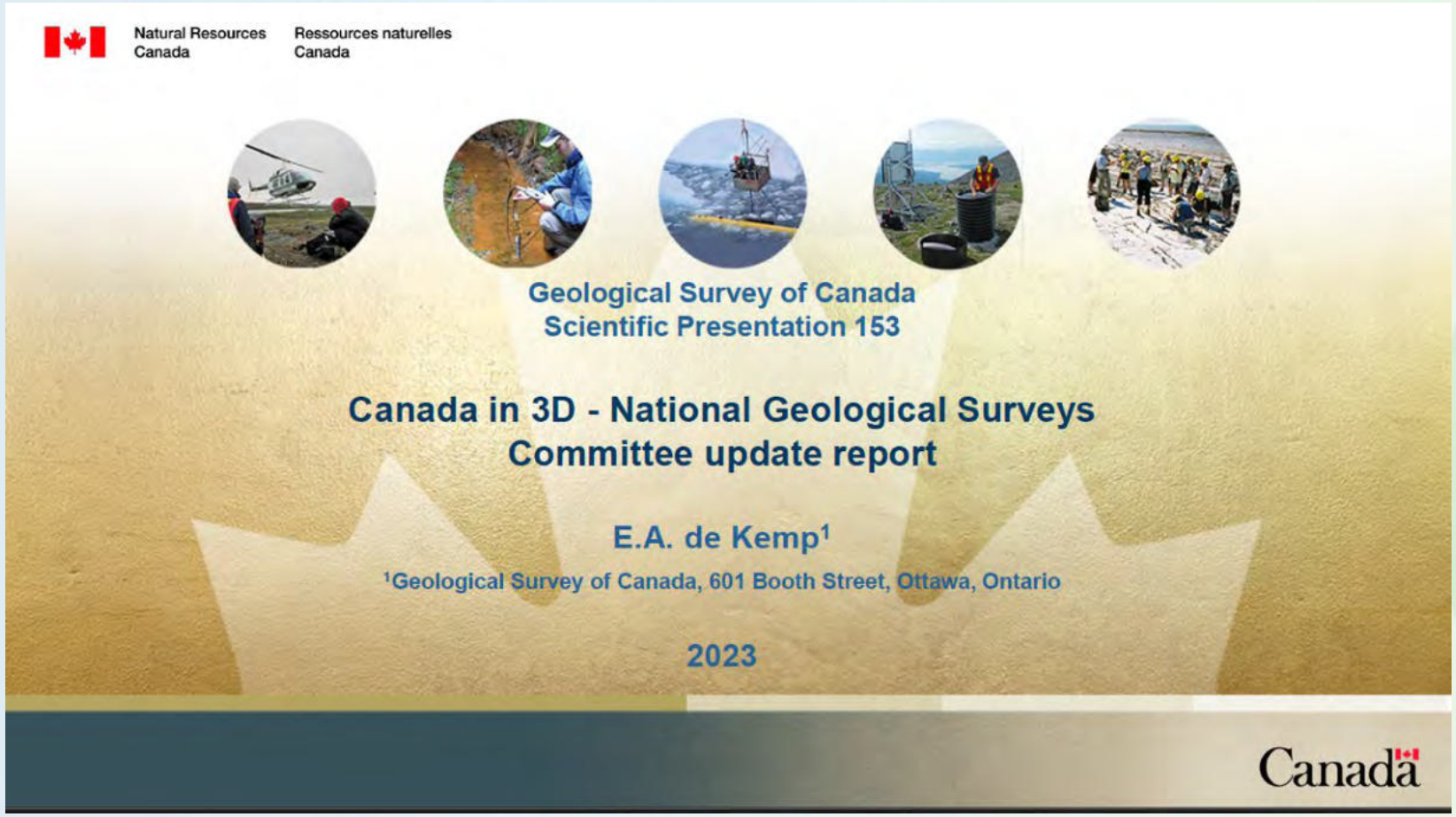
Canada-3D



Integrated Groundwater–Surface Water



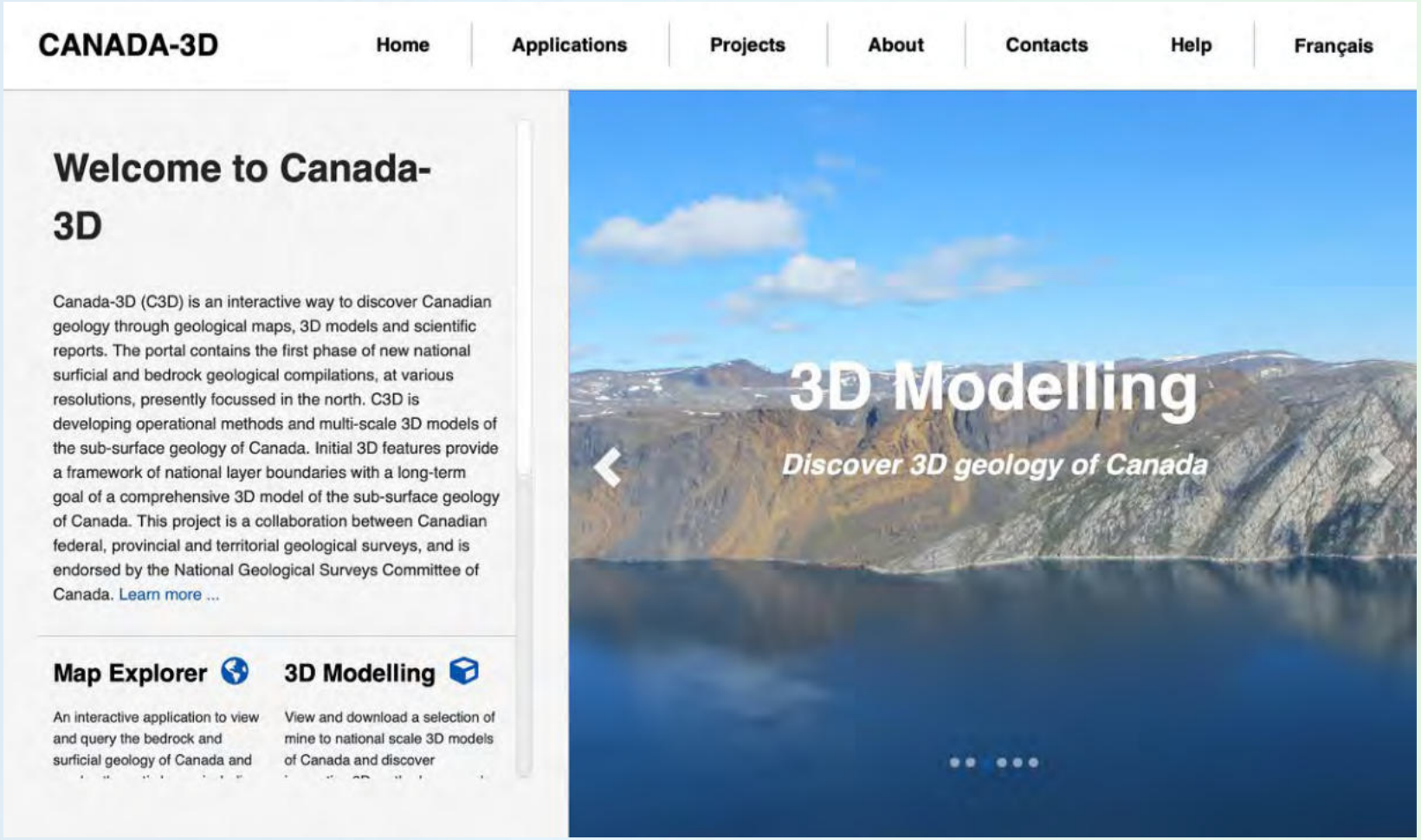
Overview Canada 3D



Compilation of presentations by provinces and territories at a national workshop in 2022

De Kemp, E.A., 2023. Canada in 3D - National Geological Surveys Committee update report; Geological Survey of Canada, Scientific Presentation 153. https://doi.org/10.4095/331340

Canada 3D



- 2014: C3D Open Geoscience Program
- 2015: Concept Paper
- 2015: C3D Workshops
- 2015: Project launch
- 2015: NGSC collaboration initiated
- 2017: RFG
- 2019:
- 2022: NGSC realignment
- 2023: Discontinued
- Focused switched to thematic , regional work

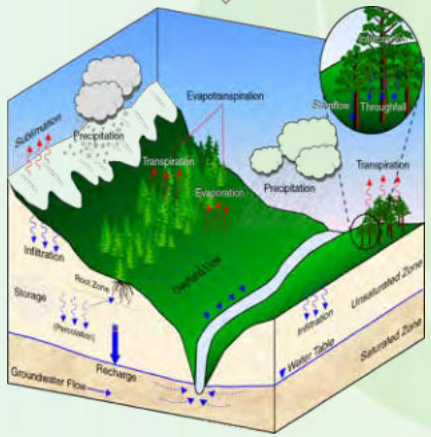
https://canada3d.geosciences.ca

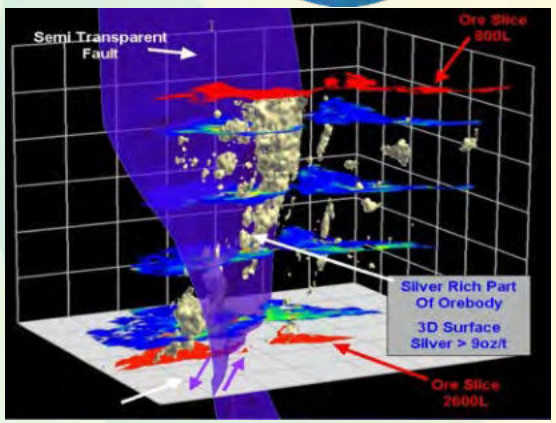
Known Users

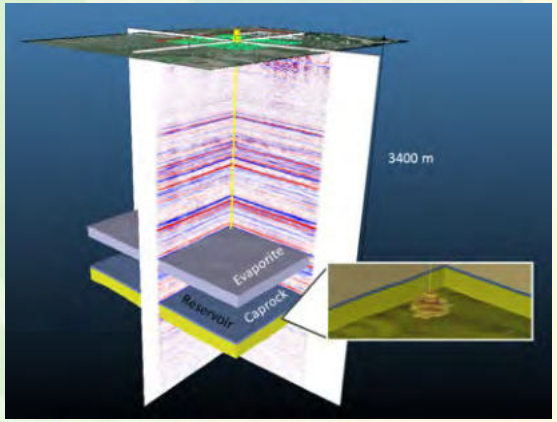
- Government Departments
- Provincial and Territorial governments
- Watershed managers
- Private Sector
  - Mining
  - Consultants
  - Groundwater
  - Geotechnical
  - Energy
- Academic



Weather / Climate Forecast



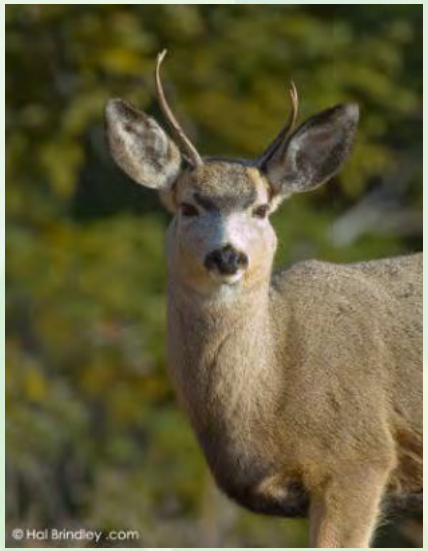




UnnknownUsers

- Illustrations from Canada1Water

  - Ungulate landscape occupation
    - Control of perineal vs ephemeral streams
    - Seasonality of access to surface water
    - Public Health - Chronic wasting disease (CWD)
  - Pesticide regulation
    - Distance to water bodies, streams



Understand your data and appropriately attribute and classify

Modelling vs Data Curation

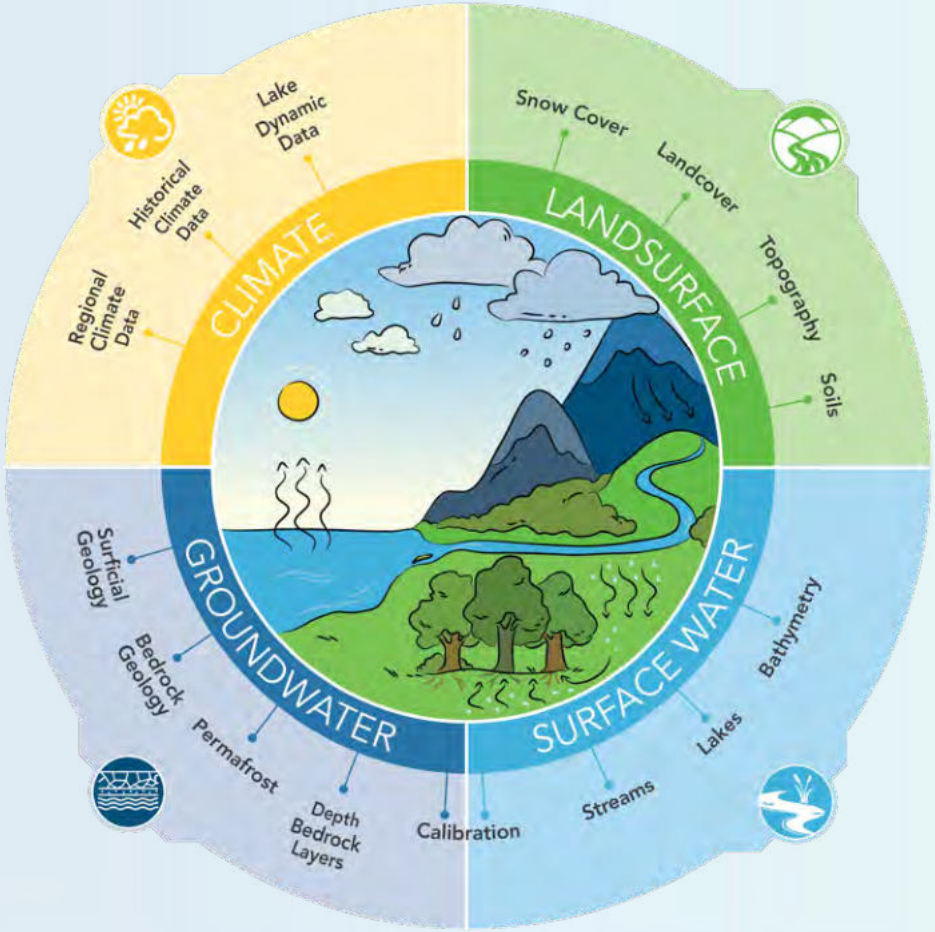
Modelling

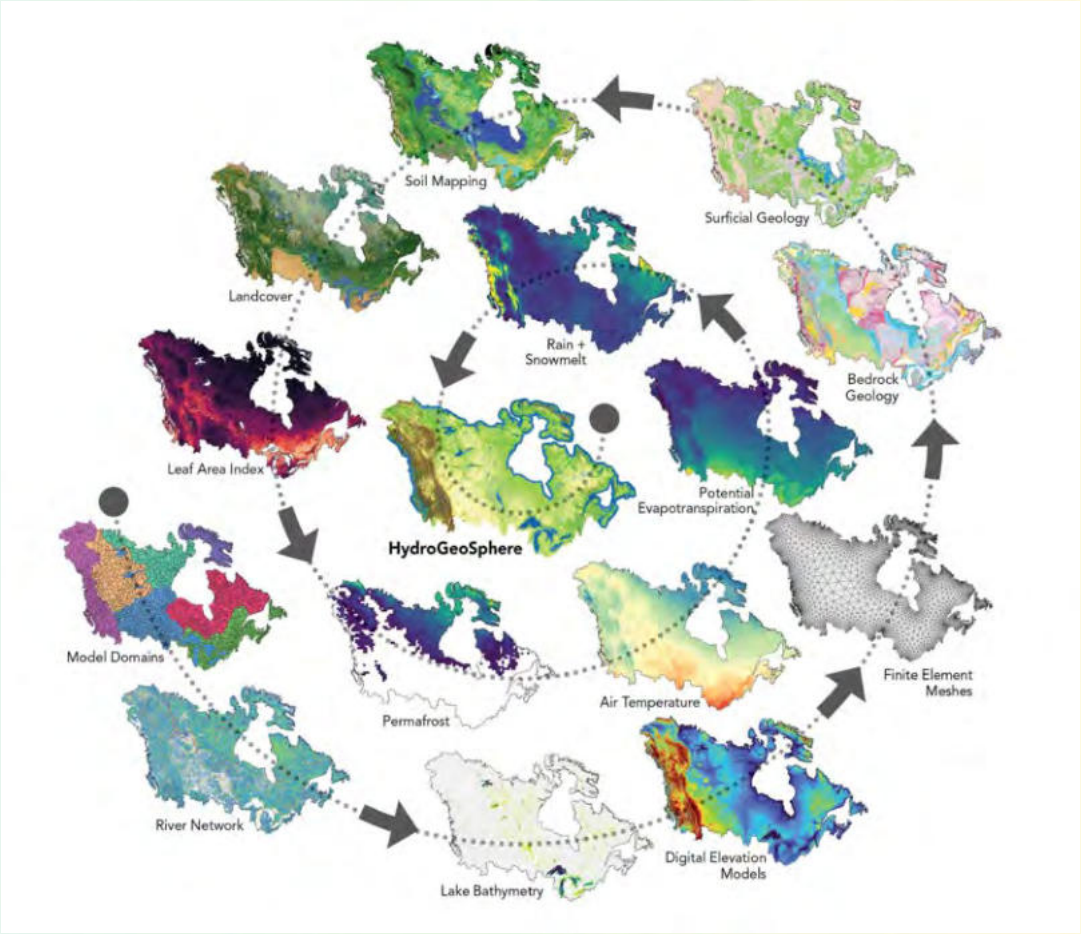
- Visualisation
- Data integration
- QA & QC
- Hypothesis testing
- Communication

Data

- The next model
- Parameter store
- Knowledge store
- FAIR
  - Findable
  - Accessible
  - Interoperable
  - Reusable

National harmonisation

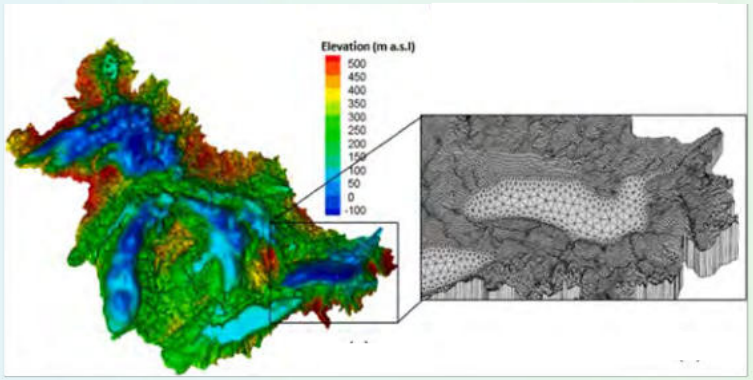




1. Government: International Commitments

- Sustainable Development Goals (SDG)
- International Joint Commission

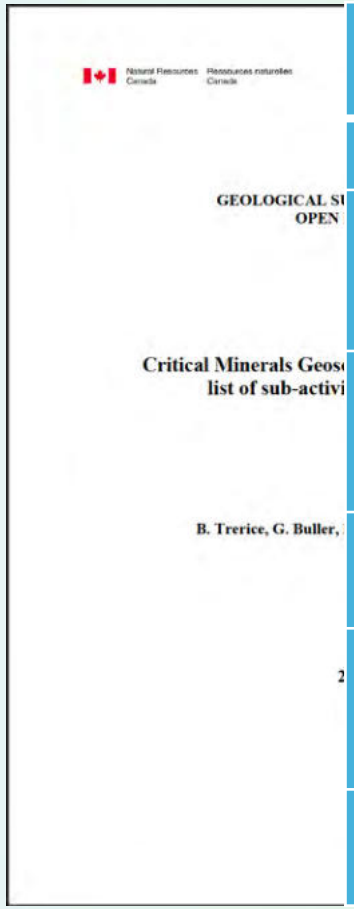






Government: Program Delivery

- Geoscience Framework
  - Geological Survey of Canada Program support
    - Critical minerals (CMGD
    - Northern Canada (GEM Geo-North)
    - Mineral deposit (TGI)
    - Groundwater
    - Hazards



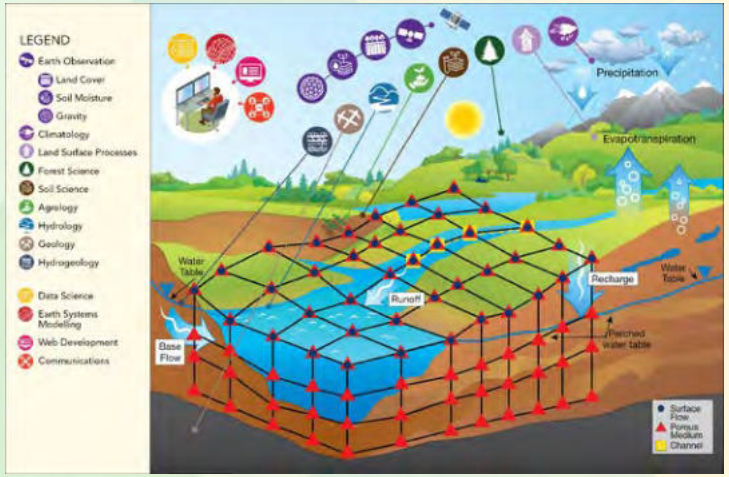
Sub-Activity Title	Principle Investigator
Canada Geological Map Compilation	Lawley, Christopher
Geophysical imaging of lithospheric structure to guide predictive modelling of critical mineral systems	Lee, Ben and Tschirhart, Victoria
Development of deep learning methodologies to improve mineral prospectivity mapping for critical minerals	Bellefleur, Gilles
AI-based 3D geological modelling for critical mineral systems	Hillier, Michael
3D structural characterization and anisotropy modelling using multidisciplinary geophysical and geological data	de Kemp, Eric
National fault inventory for critical mineral systems	de Kemp, Eric

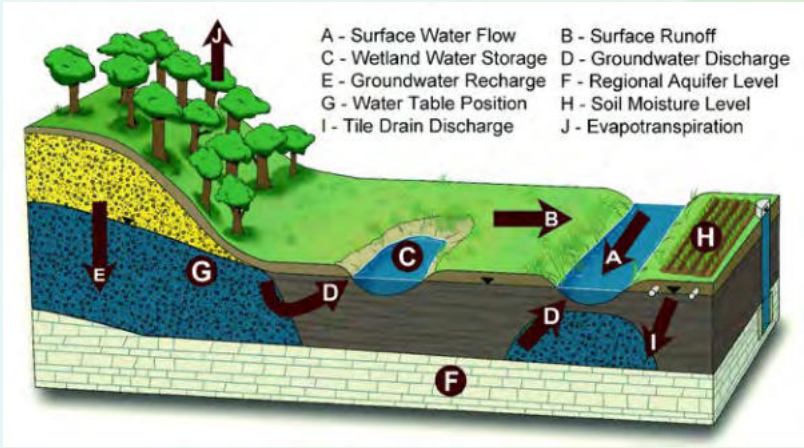
Government: Program Delivery

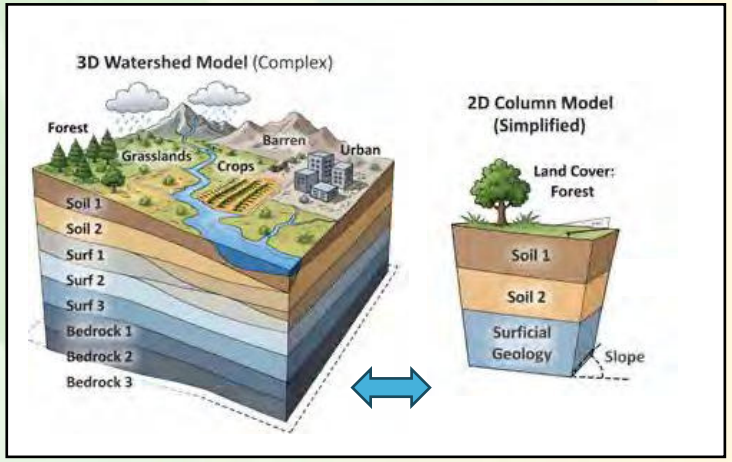
Ecosystem services (ES)
National Biodiversity Policy Division

- Geoscience Framework
  - Environment Canada
  - Nuclear Waste Management Organisation
  - Canadian Nuclear Safety Commission
  - Public Safety Canada



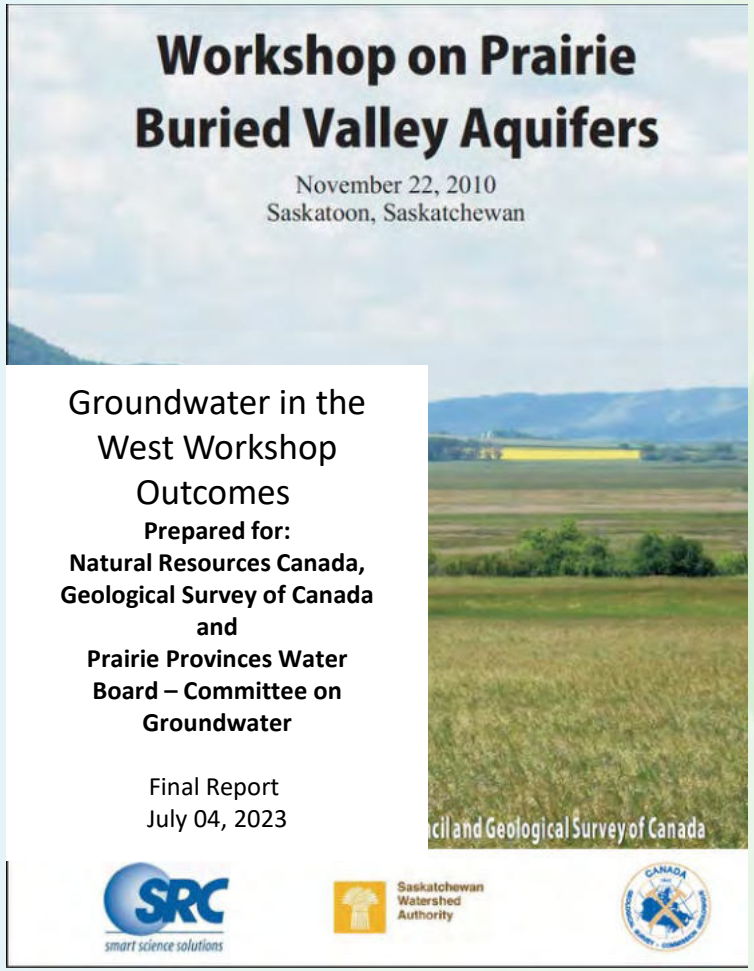


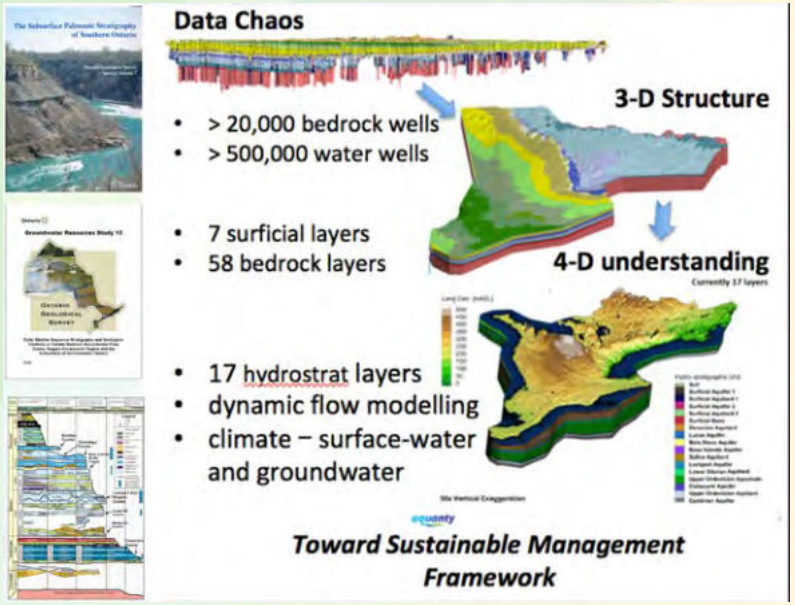




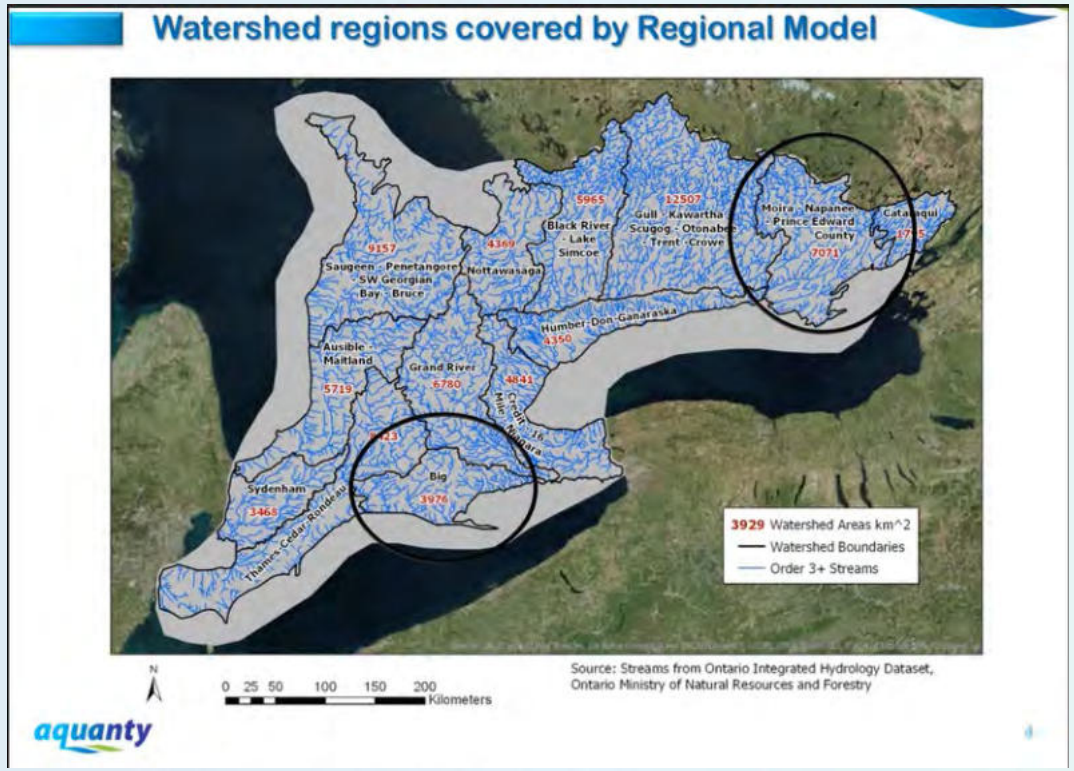
2. Provincial and Territorial Governments

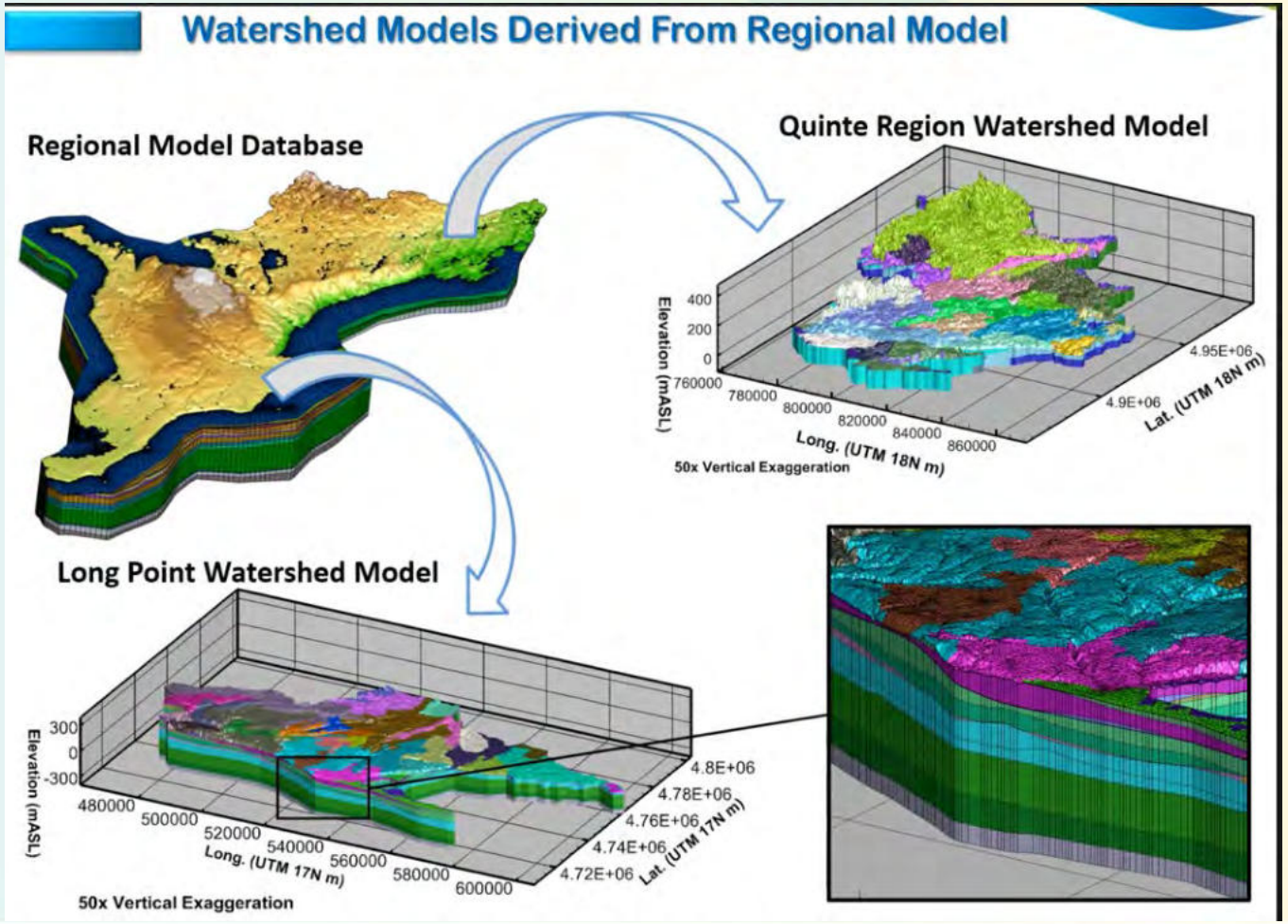
- Interprovincial Coordination
- Centre of Expertise
- Economic Development





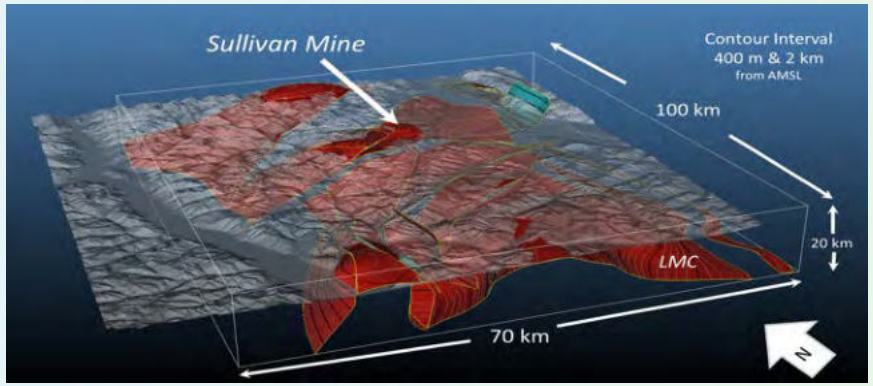
3. Watershed managers

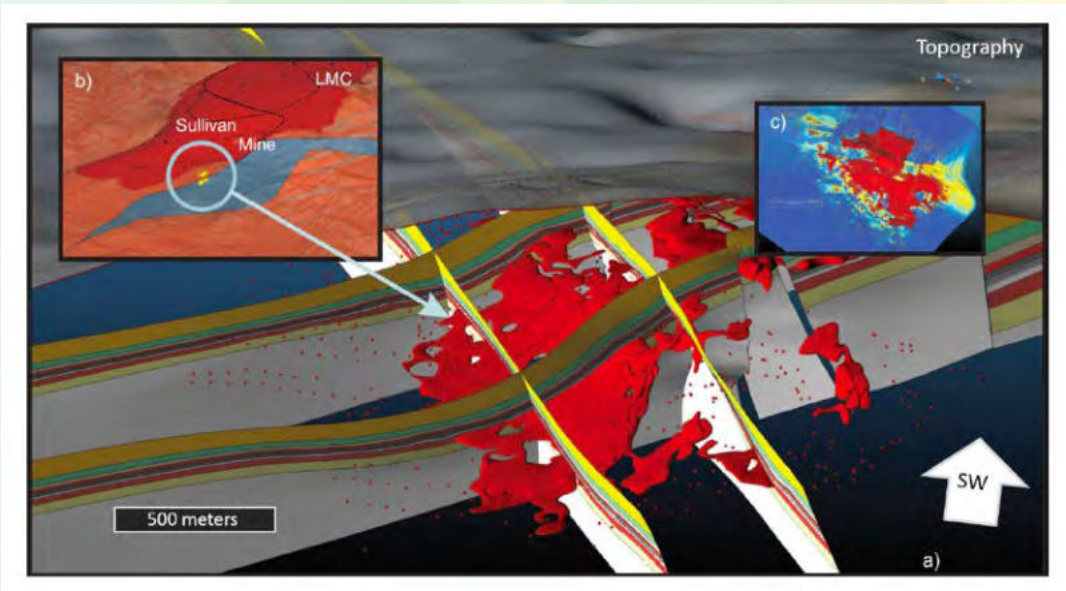




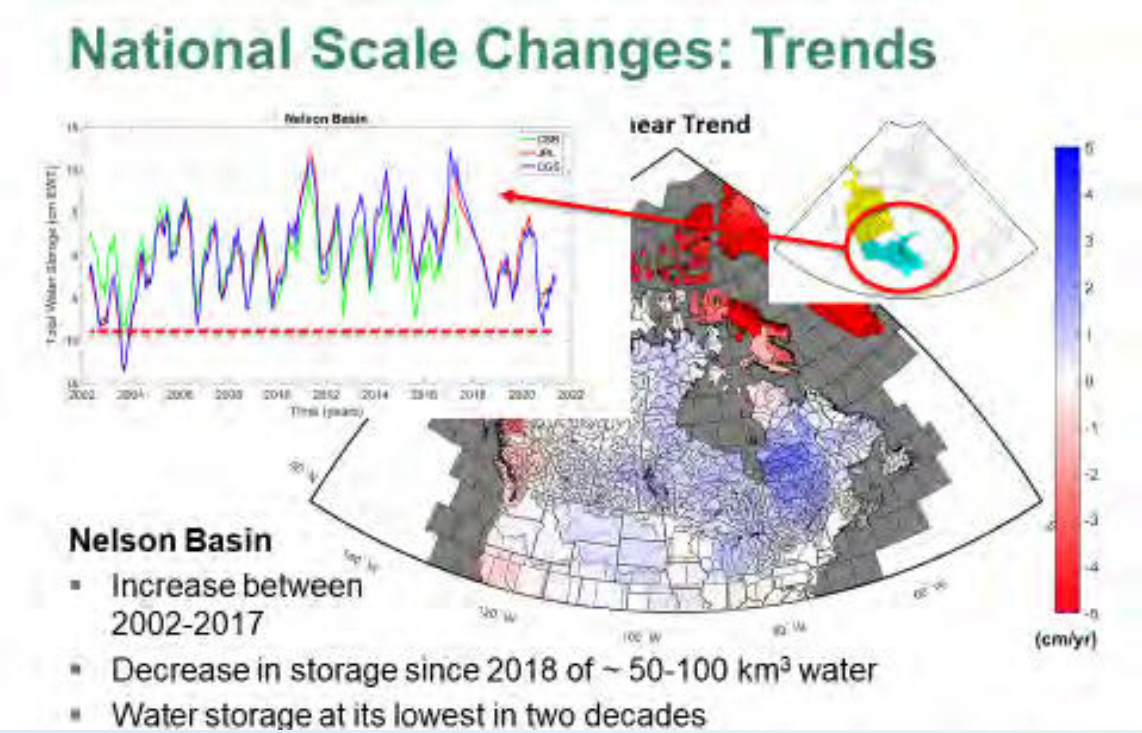
4. Private Sector: Mining

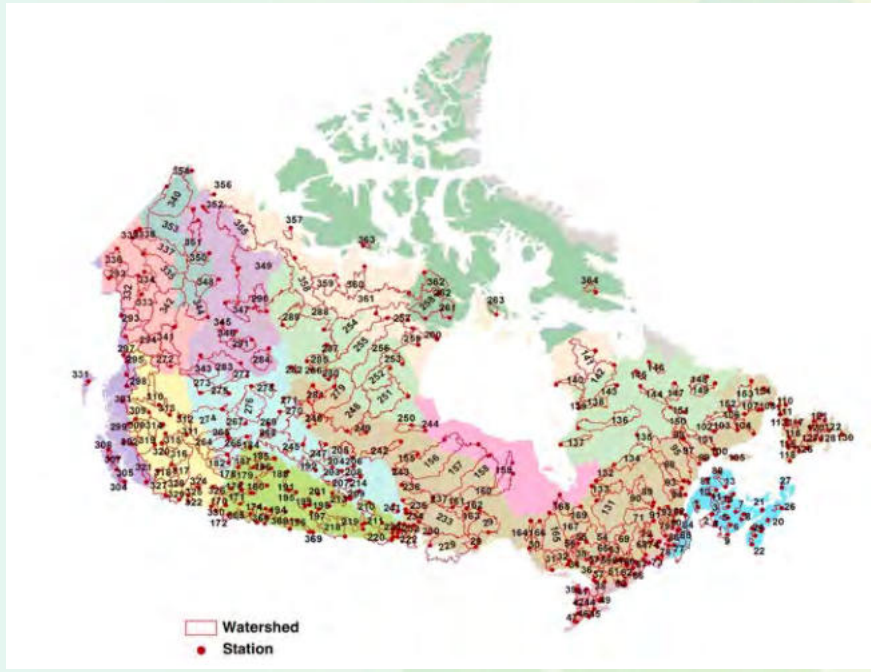
- National
- Regional
- Mineral Camp



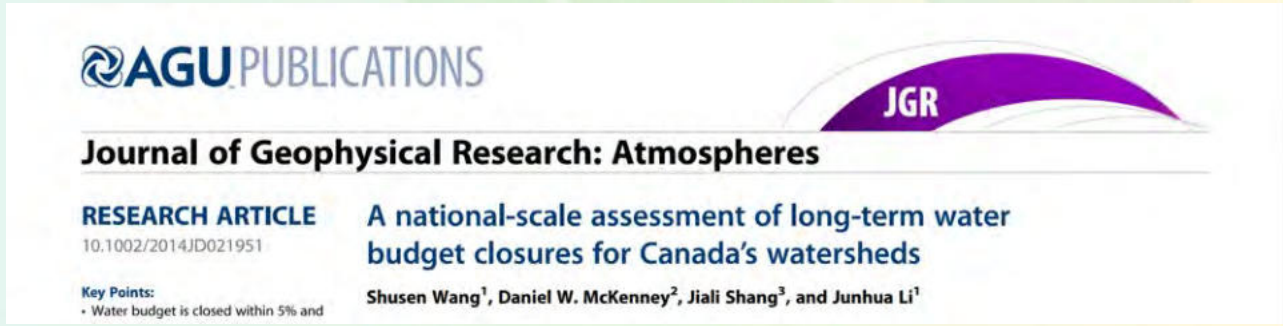


5. Academic: Science Analysis

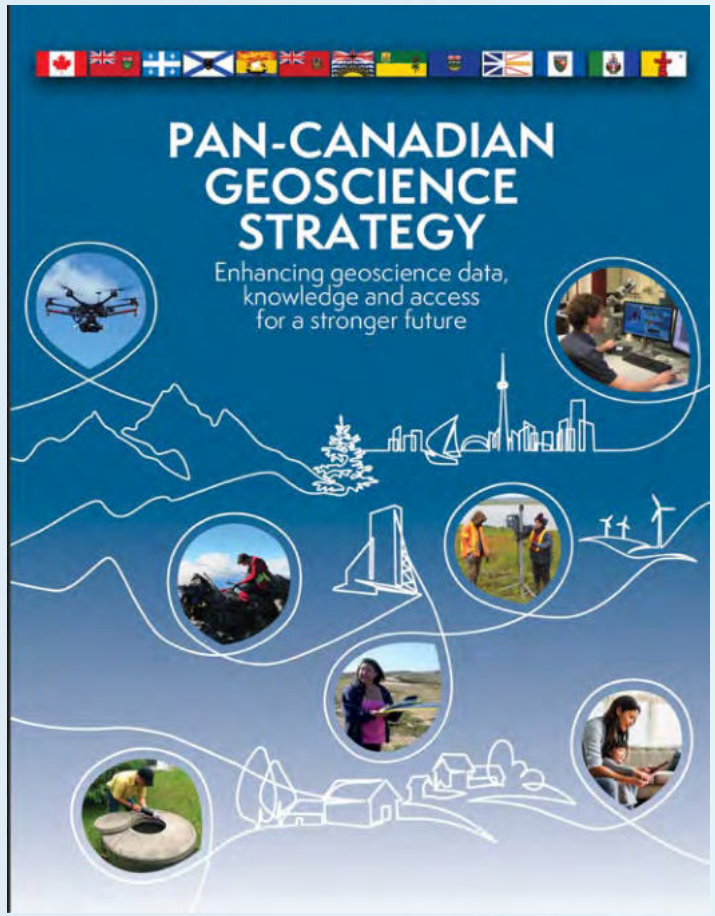


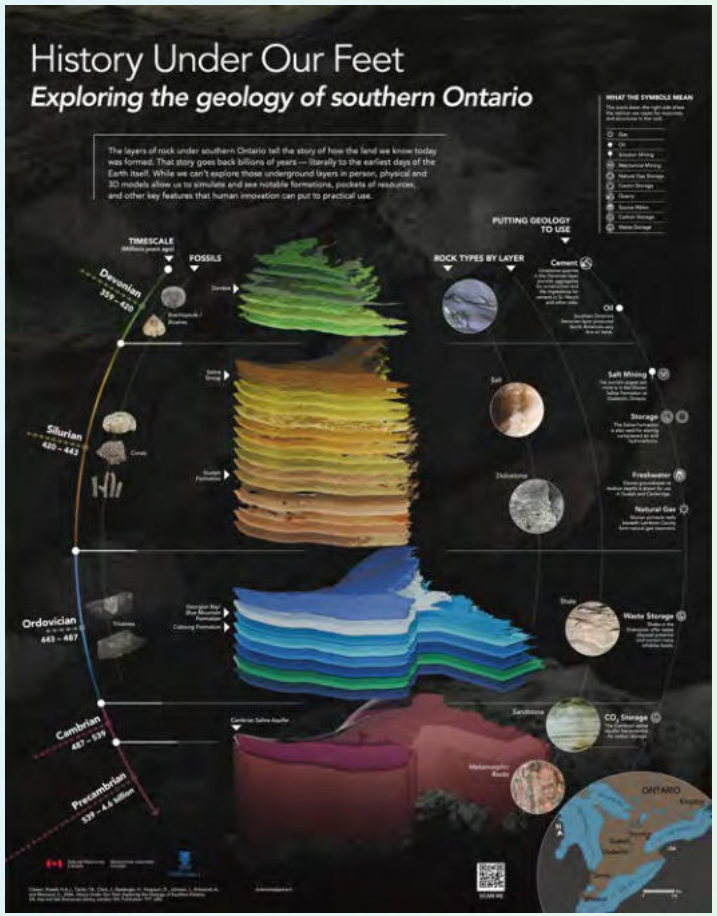


- 370 watersheds
- 3.9 million km^2,
- ~39% of Canada



6. Public Outreach









Summary

- Vision - Requires vision and communication by Geological Survey Organisation
- National – collaborative by P&T
- Data harmonization, adequate property attribution
- Clients - Understanding of the universal need for geoscience is poor