Natural Resources Canada | Ressources naturelles Canada

From building spatial infrastructures to addressing policy priorities for decision-making... Climate Change perspective

Canada Centre for Mapping and Earth Observation, Natural Resources Canada

International IDE Chile Conference, 2022

Canada

Context

- Canada has been at the leading edge of innovation and use of geospatial technologies
- Vast geography and resource potential: location-based information becoming increasing important in national discourse
- Increasing need and value of robust geospatial information: Geopolitical conditions, climate change, COVID-19
- Government priorities: emergency management, climate change adaptation, sustainable development
- New technologies, business models, rise of citizen data providers, and social media changed how we create and share geospatial information

Impacts of Climate Change on Disasters

ECONOMIC IMPACTS

Floods and wildfires are costing Canadians over $1B / year.

Floods

- There have been approx. $8.5B in natural disaster-related claims from PTs since 1970, with floods accounting for 65% of total costs.
- November 2021 British Columbia floods: costliest natural disaster in the province's history. Insured damages approx. $675M.
- Many Indigenous communities experience high frequency of floods, impacting health, safety, infrastructure, food security.

Wildfires

- Direct wildfire management costs $0.8 to $1.4 billion annually and is steadily rising due to climate change.
- Wildfire smoke costs $5B to $21B annually in health impacts in Canada.
- Wildfires can cause significant economic losses, and impact on natural resource, energy, transportation, and tourism industries.
- 2016 Fort McMurray fire caused $3.7B in insurable losses, evacuation of nearly 88,000 people, and notable disruption to oil and gas production.

Emergency Geomatics Service (EGS)

- Increased frequency and intensity of rare natural disasters in Canada such as atmospheric rivers, derechos and hurricanes has resulted in EGS response to a record number of events in 2021-22

Flood Mapping Trends

- Increased frequency and severity of regional flooding highlighted the need for comprehensive flood hazard mapping
- Predicting and mitigating cascading climate change impacts led to exploration of innovative AI-based hazard modelling

What this means for Canada's priorities

GOVERNMENT MANDATES | GEOSPATIAL WORK

Protect homes and communities from the impacts of climate change by

Completing work with provinces and territories to develop flood maps for **higher-risk** areas

Advancing work to complete flood mapping **nation-wide**

Supporting the development of a portal to provide **centralized access to information** on flood risks

Flood Hazard Identification and Mapping Program (FHIMP)

Make our communities safe and increase forest resilience to wildfire

Invest in measures to reduce risks from wildfire and supporting fire management by Indigenous communities

Deliver and operate a new wildfire monitoring satellite system

Canadian Wildland Fire Strategy

Build on the foundation of the Disaster Mitigation and Adaptation Fund …emphasis on communities most at risk

Canada's National Adaptation Strategy

Disaster resilience

Economy

Health & Wellbeing

Natural environment

Infrastructure

Enabling disaster response and emergency management by bringing together geospatial data from across Canadian jurisdictions so that it can be leveraged quickly to support policy decisions and fast response

Create a future where Canada's Northern and Arctic residents, especially Indigenous Peoples, are thriving, strong and safe

Canada's Arctic and Northern Policy Framework: Shared vision and roadmap, guiding investments and activities through 2030.

Blue Economy Strategy: Build Ocean spatial frameworks similar to land (e.g. cadas interoperability, service driven architecture). Connect the land and marine domains.

Arctic Spatial Data Infrastructure: Operational sharing and integration of Arctic data between nations and organisations. Broker land and marine data, three million circumpolar place names, maps, geoportal supporting Arctic Council's and stakeholders' decision making.

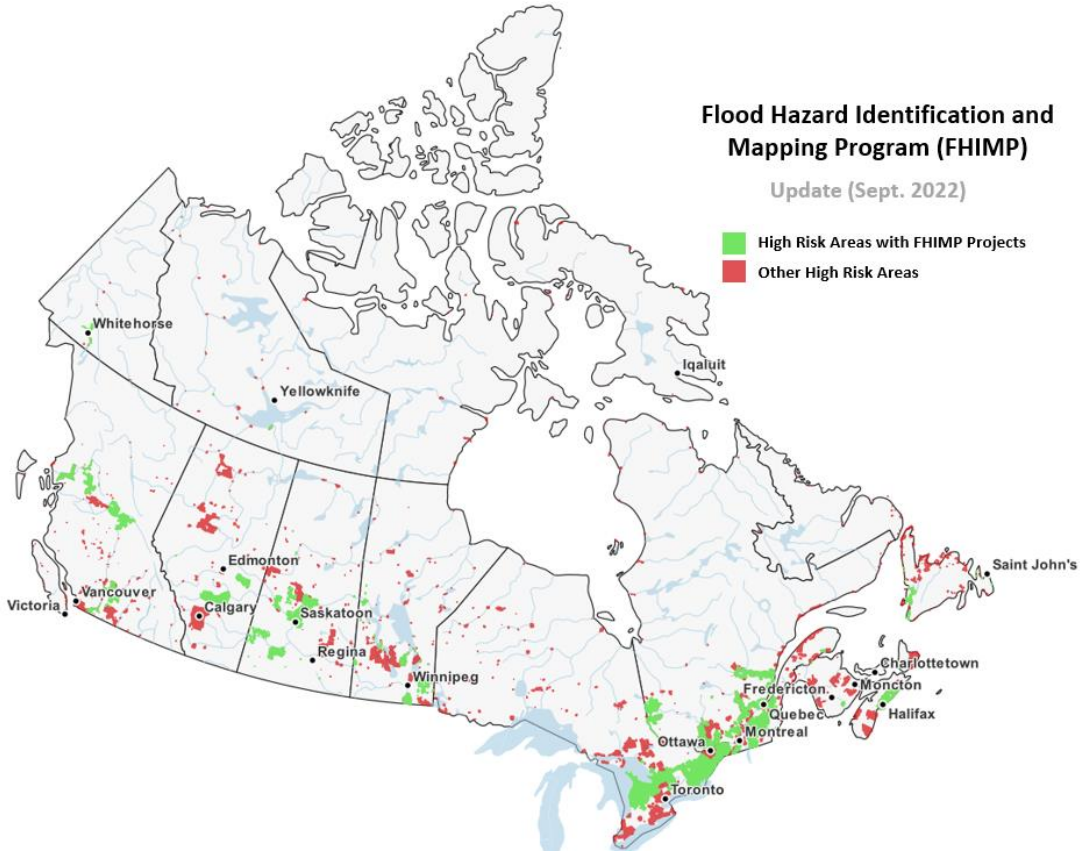
GeoConnections Program advancing the Canadian Geospatial Data Infrastructure towards supporting the development of geospatial standards to help meet the government's policy priorities such as climate change, marine sovereignty and the Arctic.

How are we meeting the priorities

KEY PROJECTS | PROGRAMS

Flood Hazard Identification and Mapping Program

- $63.8M (2021-22 – 2023-24) for mapping higher risk areas nationally, and disseminating this information publicly. Expansion announced last week (additional 138.4M / 5 years)
- Identified highest risk areas and engaged with Provinces and Territories
- Funded R&D to advance science and integrate climate-change scenarios in flood mapping practices
- Developed the Federal Flood Mapping Guideline Series and furthered the creation of national flood mapping standards



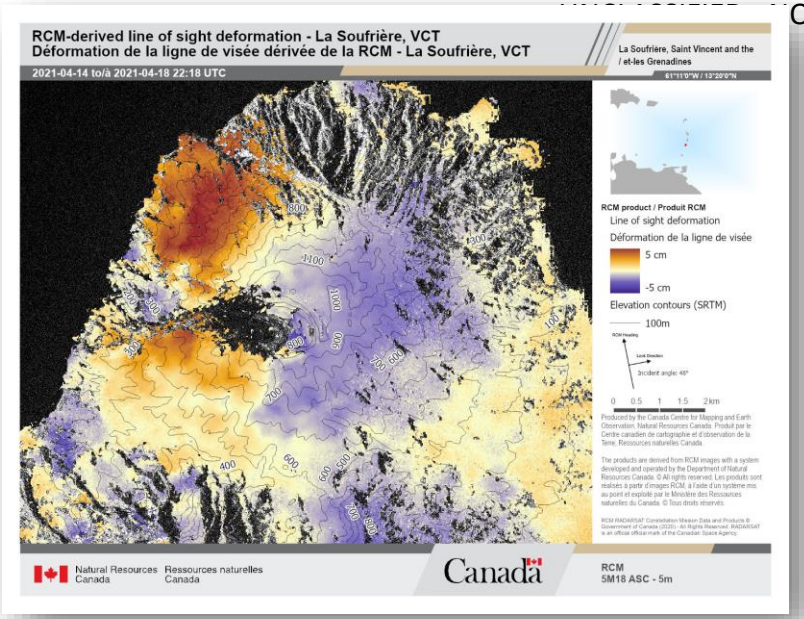
Wildfire Satellite System

- The Government of Canada has approved funding for an operational wildfire satellite monitoring service. This service will provide end-users with:
  - Near real-time information in support of wildfire management for the whole of Canada on a daily basis and for research purposes;
  - Smoke and air quality forecasts, and emissions estimates, in support of international requirements for carbon reporting.
- Natural Resources Canada's:
  - CCMEO – through its satellite ground segment – will be responsible for data acquisition, transmission and access.
  - Canadian Forest Service will be responsible for fire management products, science and user systems.
- Mission launch is planned for 2027-28. Full operations are planned for 2028.

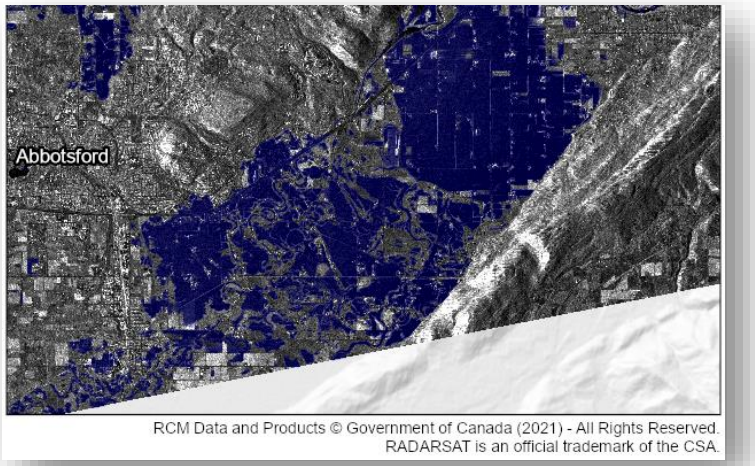
Disaster Charter

- Radarsat Constellation Mission and Canada's Earth Observation Data Management System
  - In 2021-22, NRCan successfully responded to all of the 48 International Charter: Space and Major Disasters activation requests. For each activation Canada tasked, downlinked using its ground segment infrastructure and disseminated over a hundred RCM and RADARSAT-2 data products.

- Emergency Geomatics Service (EGS)
  - Through the International Disaster Charter the EGS provides operational planning centres and responders with map products delineating flood extents and ground deformation analysis services.



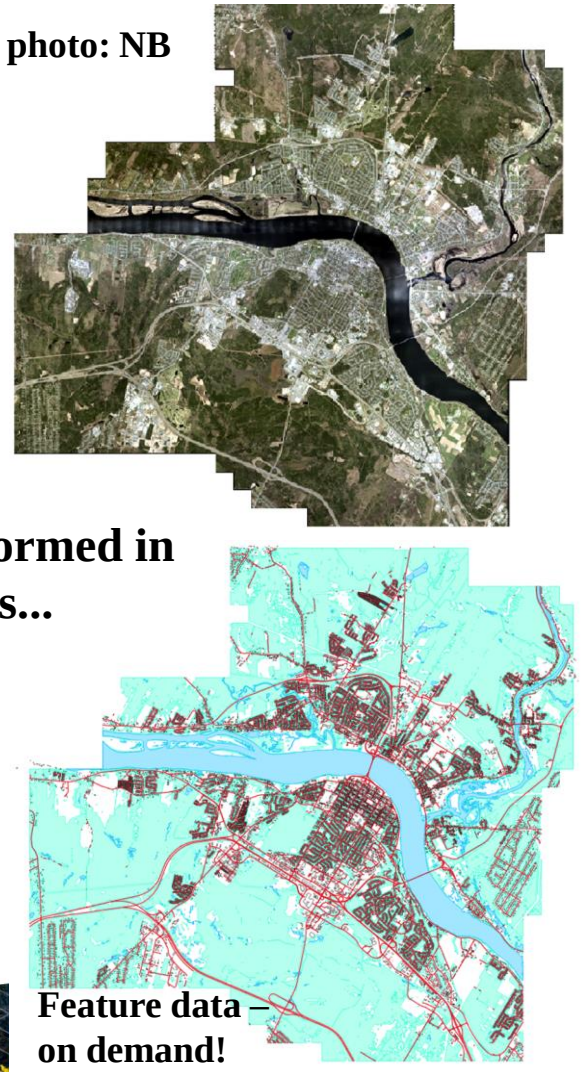
In 2021, support was provided to Saint Vincent and the Grenadines by monitoring ground deformation over an active volcano.



Flood extent maps were generated for the atmospheric river events that hit Canada's and USA's west coasts a year ago.

A transformational paradigm shift: GEO AI

- AI-based feature extraction: incredibly efficient, high quality, automated data creation from imagery, air photo, paper maps
- Once GeoAI models are trained, generating extractions on new data is rapid and low-effort: truly on-demand
- Under-utilized data rapidly transforms to usable feature data, while also improving training models
- Rapid iterations provide exceptional support for change analysis, emergency response and predictive analysis / scenario modeling



GeoAI Pipeline pilot project with province of New Brunswick (NB)

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