

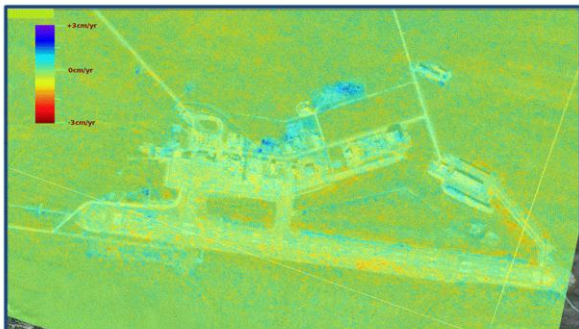
Mapping Permafrost Displacement

Satellite images are being used to map locations in NWT communities susceptible to permafrost thaw.

CONTEXT

The warming of air and ground temperatures in the Northwest Territories is thawing permafrost. This creates challenges and potential hazards for new and existing infrastructure built on permafrost. This project facilitates the application and further development of techniques and methods to monitor and predict the effects of permafrost subsidence and upheaval as a tool for climate change adaptation planning.

Inuvik Airport – DInSAR temporal analysis - C-Band: Feb-Sept 2012
AANDC - GNWT ENR CCAdapt SAR CMP
Surficial Displacement Rate ~ +/- 1.5 cm @ 2m GSD



OBJECTIVE

This project uses satellite imagery to produce community permafrost subsidence hazard maps. Information products, such as GIS maps, can help inform decisions about selection of sites for future development. Maps identifying current terrain compositions and conditions provide critical information needed for future development and current infrastructure monitoring.

The project can also help to create best practices for satellite permafrost hazard mapping, specifically Differential Interferometry Synthetic Aperture Radar (DInSAR).

APPROACH

DInSAR is able to measure earth surface displacements with great precision, often to less than centimeter levels. Multiple RADARSAT-2 satellite images will be acquired during the summer and fall, when satellite images are at the highest quality.

A minimum of five images, taken at different times, are required to detect change. As best results are obtained over several years, long-term monitoring over a multi-year period will improve the overall quality of the RADAR data (15 images for optimum quality).

EXPECTED RESULTS

Initial permafrost monitoring for the NWT is underway for Inuvik, Tuktoyaktuk, Fort Simpson and Norman Wells. Building on this work will result in the production of an important body of knowledge related to permafrost changes in these areas. It also complements a similar Natural Resources Canada led project for Yellowknife and the NWT.

The data are anticipated as potential support for new projects and exploration areas. They provide important temporal information on terrain conditions which can support effective climate change adaptation strategies. The imagery and products are intended to be incorporated in the GNWT Spatial Data Infrastructure (SDI).

After processing this data, products will be available depicting the movement of buildings and other infrastructure including roads and airports. Data will be produced by community showing vertical displacement and will be publically available.

Significance

Climate change adaptation planning can take place by mapping areas where permafrost is thawing. Areas that are at risk can be identified and community planning can benefit.

Partners

- NWT Center for Geomatics
- Aboriginal Affairs and Northern Development Canada
- Natural Resources Canada
- Canadian Space Agency
- 3V Geomatics Inc.

FOR MORE INFO

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