



Canada Centre for
Remote Sensing

Centre canadien
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Centre for Geomatics

Northwest Territories
Municipal and Community Affairs



Seasonal Surface Displacement Derived from InSAR, Yellowknife and Surrounding Area, Northwest Territories

Seasonal surface displacement was derived for Yellowknife and the surrounding area using satellite Interferometric Synthetic Aperture Radar (InSAR) data from the summer of 2010. RADARSAT-2 Ultra-fine scenes acquired on May 21, July 8, August 1, August 25 and September 18 were interferometrically stacked and the total amount of summer vertical displacement was calculated according to the methodology outlined in Short et al. (2011, *Remote Sensing of Environment*, doi:10.1016/j.rse.2011.08.012). Each displacement measurement is representative of a ground surface area of approximately 5 m x 4 m.

InSAR results in this map have only been qualitatively evaluated and therefore are presented in terms of the relative amount of displacement and not absolute values. Stable ground represents locations where no vertical change was calculated or where displacement was within the expected range of error (± 1 cm). Low and moderate downward displacement represents surface decrease on the order of -1 to -3 cm and -3 to -6 cm, respectively. Upward displacement represents a surface increase of up to 6 cm. At some locations, a loss of interferometric coherence occurred as a result of significant changes in surface characteristics and no calculations were made.

The depicted surface displacement may be a product of natural or human-induced processes. Downward surface displacement may result from seasonal subsidence caused by thawing of the active layer (seasonally-frozen ground) or permafrost (perennially-frozen ground) or soil compaction. Upward surface displacements may result from ground surface heave or vegetation growth. At present, no explicit displacement process is inferred from the InSAR data, though probable causes of displacement may be derived from field inspections. Future map versions may include a quantitative assessment of the calculations and the net surface displacement determined over consecutive years.

Date Sources and Acknowledgements:

Road network and existing buildings courtesy of the City of Yellowknife; transportation right-of-way and former building footprint courtesy of the NWT Department of Municipal and Community Affairs (MACA); trail networks courtesy of the City of Yellowknife and MACA; National Topographic Database water bodies at 1: 50 000 scale from GeoGratis; mapping and data support by Colin Avey, GNWT, Environment and Natural Resources Division.

Disclaimer

Her Majesty the Queen in right of Canada as represented by the Minister of Natural Resources, the Government of the Northwest Territories as represented by Environment and Natural Resources and Municipal and Community Affairs, and the City of Yellowknife, do not warrant or guarantee the accuracy or completeness of the information ("Data") on this map and do not assume any responsibility or liability with respect to any damage or loss arising from the use or interpretation of the Data.

The Data on this map are intended to convey regional trends and should be used as a guide only. The Data should not be used for design or construction at any specific location, nor are the Data to be used as a replacement for the types of site-specific geotechnical investigations.

LEGEND

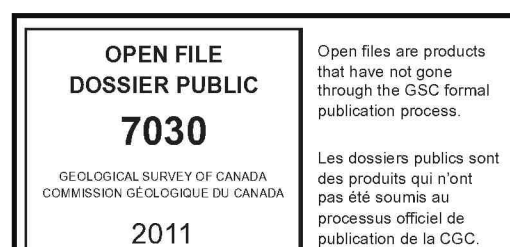
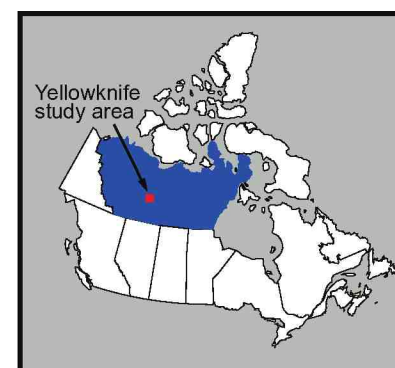
Relative surface displacement

- Moderate downward displacement (-3 to -6 cm)
- Low downward displacement (-1 to -3 cm)
- Stable (± 1 cm)
- Upward displacement (1 to 6 cm)
- Loss of InSAR coherence

- Trails
- Roads
- Transportation right-of-way
- Existing buildings
- Former building footprint
- Water
- No data

The map is available from:

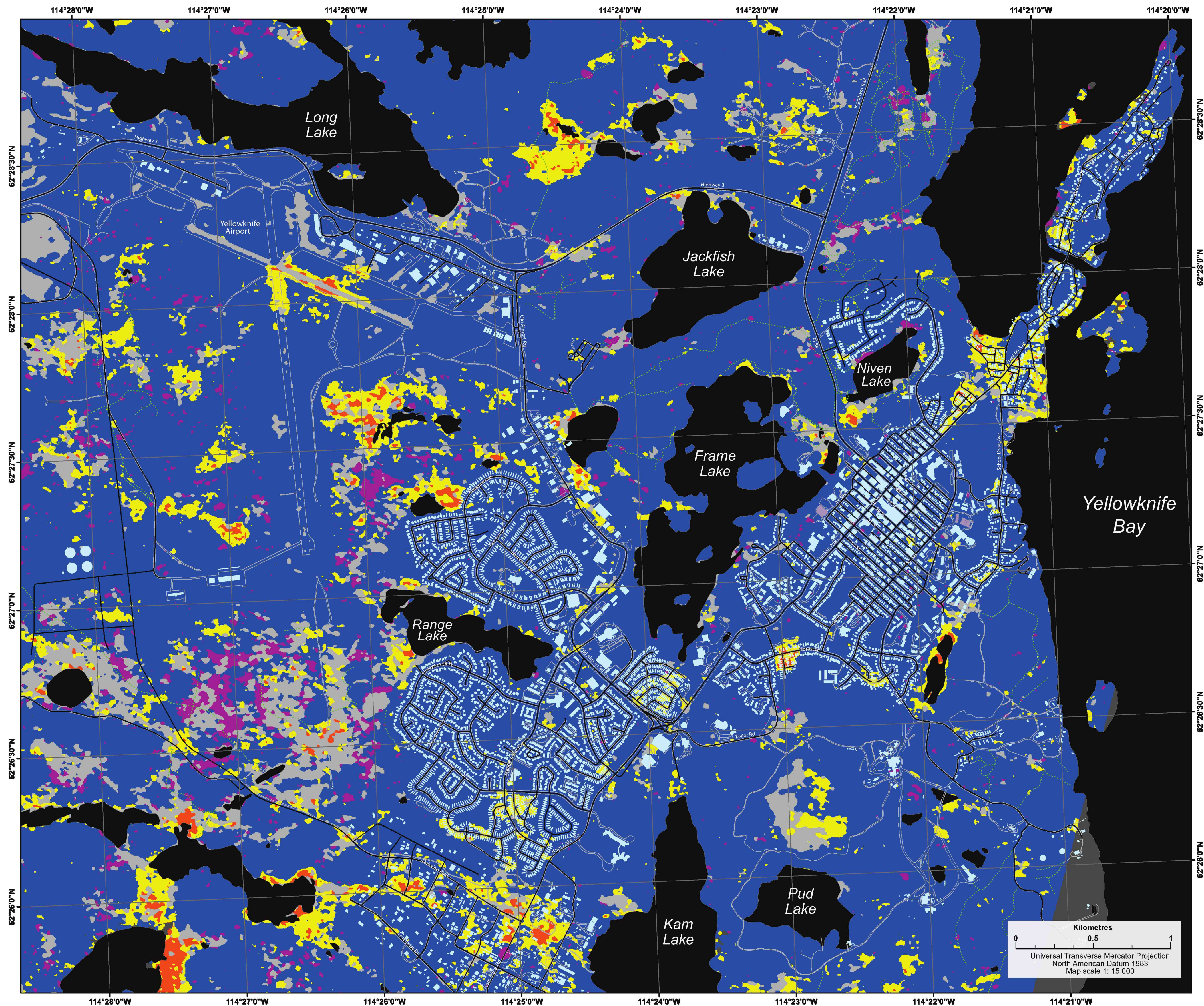
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