Seasonal surface displacement was derived for Yellowknife and the surrounding area using satellite interferometric synthetic aperture radar (InSAR) data from the summer of 2015. RADARSAT-2 (11-day repeat) scenes acquired on May 21, July 8, August 1, August 15 and September 18 were interferometrically stacked and the seasonally non-flat models were extracted using a methodology outlined in Short et al. (2011). Remote Sensing of Environment, doi:10.1016/j.rse.2011.08.021. Each displacement measurement is representative of a ground surface area of approximately 5 m x 4 m.

InSAR results in the map have been qualitatively evaluated and therefore are presented in terms of the relative magnitude of displacement and not absolute values. Stabile ground represents locations where no vertical change was observed. Minor ground displacement (1 to 3 cm) and moderate ground displacement (3 to 10 cm) are shown in red. Low and moderate downward displacement represents surface decrease on the order of 3 to 6 cm and 3 to 10 cm, respectively. Upward displacement represents a surface increase of up to 6 cm. At some locations, the loss of interferometric coherence occurred as a result of significant changes in surface texture caused by vegetation growth or ground disturbance.

The depicted surface displacement may be a product of natural or human-induced factors. Variations in seasonal surface displacement may result from seasonal instabilities caused by thawing of the active layer (seasonally-thawed ground) or permafrost. Seasonal freeze-thaw cycles or rain events can cause upward displacement. Surface displacements may result from ground surface heave or vegetation growth. At present, no explicit displacement data is obtained from the InSAR analysis. The presence of areas with no data or loss of interferometric coherence may result from changes in surface texture, vegetation growth or ground disturbance.

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 (DMCA). Land parcels courtesy of the City of Yellowknife and NWT Land Services. Map legend and data support by Oasis Aquea (SWIFT, Environment and Natural Resources Division).

Disclaimer:
The Ministry of the Environment, of the Government of the Northwest Territories, Canada, does not warrant or guarantee the accuracy of the information or the reliability or quality of the data. The data provided here are intended for general reference only. The Source of the data is indicated on the map. The data should not be used for design or construction of any specific activity; nor are the data to be used as a substitute for the specific geological investigations.

LEGEND

Relative surface displacement:
- Minor (downward displacement 1 to 3 cm)
- Low (downward displacement 3 to 6 cm)
- Stabile (no change)
- Minor (upward displacement 1 to 3 cm)
- Low (upward displacement 3 to 6 cm)
- Loss of InSAR coherence

Relevant citation: