Canadian Urban Environmental Health Research Consortium

CANUE Metadata NDVI Landsat V1.0
2017-10-23

DATA SET INFORMATION	
Data Set Title:	**Normalized Difference Vegetation Index (NDVI) Landsat Time Series**
Description:	Top of Atmosphere (TOA) reflectance data in bands from the USGS's Landsat 5 and Landsat 8 satellites were accessed via Google Earth Engine (https://explorer.earthengine.google.com/#detail/LANDSAT%2FLT5_L1T_TOA), (https://explorer.earthengine.google.com/#detail/LANDSAT%2FLC8_L1T_TOA). CANUE staff used Google Earth Engine functions to create cloud free annual growing season composites, and mask water features, then export the resulting band data. NDVI indices for each time period were then calculated as (band 4 - Band 3)/(Band 4 + Band 3) for Landsat 5 data, and as (band 5 - band 4)/(band 5 + Band 4) for Landsat 8 data. Greenest pixel data calculated by Google from Landsat 5 and Landsat 8 were also accessed via Google Earth Engine (https://explorer.earthengine.google.com/#detail/LANDSAT%2FLT5_L1T_ANNUAL_GREENEST_TOA), (fhttps://explorer.earthengine.google.com/#search/LANDSAT%2FLC8_L1T_ANNUAL_GREENEST_TOA). These composites are created from all the scenes in each annual period beginning from the first day of the year and continuing to the last day of the year. All the images from each year are included in the composite, with the greenest pixel as the composite value, where the greenest pixel means the pixel with the highest value of the Normalized Difference Vegetation Index (NDVI). No data were available for 2012, due to decommissioning of Landsat 5 in 2011 prior to the start of Landsat 8 in 2013. No cross-calibration between the sensors was performed, please be aware there may be small bias differences between NDVI values calculated using Landsat 5 and Landsat 8. Final NDVI metrics both annually and for the growing season (defined as May 1st through August 31st) were linked to all 6-digit DMTI Spatial single link postal code locations in Canada, and for surrounding areas within 100m, 250m, 500m, and 1km.
Theme Keywords:	Greenness, Landsat, NDVI, satellite monitoring, normalized difference vegetation index, annual,
Place Keywords:	Canada national
Data preparation date:	8/1/2017
File Names	GRLAN_AMN_YY.csv (annual mean NDVI); GRLAN_GMN_YY.csv (growing season mean NDVI); GRLAN_GP_YY.csv (annual greenest pixel value); where YY is the last two digits of a specific year
File Type:	Comma separated values (.csv)
Beginning Date:	1984
End Date:	2015
Sampling Frequency of Data:	Annual, except 2012
Number of Data Files:	32 files each for annual mean NDVI, growing season mean, and annual greenest pixel, except for 2012
File Size	Individual year files range from 47 MB to 70 MB in size, all 32 files for each metric are 1.9 GB in size, all files for all metrics total 5.7 GB in size.
Data Sources:	See Data Description and Supporting Documentation
Spatial Resolution:	30 metres
Detection Range or Limit:	-1 to +1
Log of Changes:	N/A
Maintenance Description:	Indices for subsequent years will be added when available.

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GEOSPATIAL REFERENCE	
Geographic Coverage	Canada
West Bounding Coordinate	N/A
East Bounding Coordinate	N/A
North Bounding Coordinate	N/A
South Bounding Coordinate	N/A
Geometry Type:	N/A
Point Data Source:	N/A
Coordinates have Z values:	N/A
Geographic Coordinate System:	N/A
Datum	N/A
Unit:	N/A
QUALITY ASSESSMENT	
QA/QC procedures:	CANUE did not assess the quality of the Landsat data. Users should review the documentation provided in the recommended citation, and in the supporting documentation listed below.
Geographic Coordinate Positional Accuracy:	These metrics can be linked to the corresponding annual postal codes files for mapping and analysis purposes, using the 6-digit postal code as a unique identifier in both files. Refer to the following metadata file for additional information on opportunties for assessing the spatial representativeness of postal code locations when these metrics are linked:
	CANUE Metadata Postal Codes V1.0.pdf
Vertical Positional Accuracy:	N/A
Attribute Accuracy:	N/A
Data Validity :	N/A
Associated Files:	N/A
Data Comment:	Maximum NDVI values of +1 may indicate residual cloud contamination or other image annomalies. Interannual annomolies in NDVI values may be reduced through the use of temporal averaging.
SUPPORTING DOCUMENTATION	
Additional documentation:	Additional technical and supporting publications: [1] https://landsat.usgs.gov/landsat-5 [2] LANDSAT 8 (L8) Data Users Handbook Version 2.0 March 29, Department of the Interior, U.S. Geological Survey. landsat.usgs.gov/landsat-8-l8-data-users-handbook. Accessed September 14, 2017. [3] Robinson, N.P.; Allred, B.W.; Jones, M.O.; Moreno, A.; Kimball, J.S.; Naugle, D.E.; Erickson, T.A.; Richardson, A.D. A Dynamic Landsat Derived Normalized Difference Vegetation Index (NDVI) Product for the Conterminous United States. Remote Sensing. 2017, 9, 863. [4] Gyanesh Chander, Brian L. Markham, Dennis L. Helder. Summary of current radiometric calibration coefficients for Landsat MSS, TM, ETM+, and EO-1 ALI sensors, Remote Sensing of Environment, Volume 113, Issue 5, 2009, Pages 893-903.

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DATA DICTIONARY		
Field Name (YY = last two digits of specific year of data)	**Description**	**Data Type**
GRLAN_AMN_YY.csv files		
GRLANYY_PC	6-digital postal code with no space between the FSA and LDU. (i.e. L1R2H2)	Text
GRLANYY_01	Annual mean value at postal code (range -1 to +1)	Numeric
GRLANYY_02	Annual mean of means 100m (range -1 to +1)	Numeric
GRLANYY_03	Annual mean of means 250m (range -1 to +1)	Numeric
GRLANYY_04	Annual mean of means 500m (range -1 to +1)	Numeric
GRLANYY_05	Annual mean of means 1000m (range -1 to +1)	Numeric
GRLANYY_06	Annual max of means 100m (range -1 to +1)	Numeric
GRLANYY_07	Annual max of means 250m (range -1 to +1)	Numeric
GRLANYY_08	Annual max of means 500m (range -1 to +1)	Numeric
GRLANYY_09	Annual max of means 1000m (range -1 to +1)	Numeric
GRLAN_GMN_YY.csv files		
GRLANYY_PC	6-digital postal code with no space between the FSA and LDU. (i.e. L1R2H2)	Text
GRLANYY_10	Growing Season mean value at postal code (range -1 to +1)	Numeric
GRLANYY_11	Growing Season mean of means 100m (range -1 to +1)	Numeric
GRLANYY_12	Growing Season mean of means 250m (range -1 to +1)	Numeric
GRLANYY_13	Growing Season mean of means 500m (range -1 to +1)	Numeric
GRLANYY_14	Growing Season mean of means 1000m (range -1 to +1)	Numeric
GRLANYY_15	Growing Season max of means 100m (range -1 to +1)	Numeric
GRLANYY_16	Growing Season max of means 250m (range -1 to +1)	Numeric
GRLANYY_17	Growing Season max of means 500m (range -1 to +1)	Numeric
GRLANYY_18	Growing Season max of means 1000m (range -1 to +1)	Numeric
GRLAN_GP_YY.csv files		
GRLANYY_PC	6-digital postal code with no space between the FSA and LDU. (i.e. L1R2H2)	Text
GRLANYY_19	Greenest Pixel value at postal code (range -1 to +1)	Numeric
GRLANYY_20	Mean of greenest pixel values 100m (range -1 to +1)	Numeric
GRLANYY_21	Mean of greenest pixel values 250m (range -1 to +1)	Numeric
GRLANYY_22	Mean of greenest pixel values 500m (range -1 to +1)	Numeric
GRLANYY_23	Mean of greenest pixel values 1000m (range -1 to +1)	Numeric
GRLANYY_24	Max of greenest pixel values 100m (range -1 to +1)	Numeric
GRLANYY_25	Max of greenest pixel values 250m (range -1 to +1)	Numeric
GRLANYY_26	Max of greenest pixel values 500m (range -1 to +1)	Numeric
GRLANYY_27	Max of greenest pixel values 1000m (range -1 to +1)	Numeric

DATA SET CONTACTS	
Data Support:	Contact CANUE via the email below.
Email:	info@canue.ca
Affiliated Organization:	CANUE (Canadian Urban Environmental Health Research Consortium)
	Dalla Lana School of Public Health, University of Toronto
Website:	www.canue.ca
City:	Toronto
Prov/State:	Ontario
Country:	Canada

CANUE	**Canadian Urban Environmental Health Research Consortium** **CANUE Metadata NDVI Landsat V1.0** **2017-10-23**
Exposure Data Source Contact:	For questions relating to LandSat data in general:
Email:	custserv@usgs.gov
Phone:	800-252-4547
First Name:	N/A
Last Name:	N/A
Affiliated Organization:	Department of the Interior, U.S. Geological Survey (USGS)
City:	Sioux Falls
Prov/State:	South Dakota
Country:	USA
DATA USE CONDITIONS	
Conditions of Use:	The Data User is REQUIRED: (i) to acknowledge data sources listed under Acknowledgement(s); (ii) cite the publication(s) listed under Recommended Citation(s) as the providers and source of these data when using them in support of research, analysis, operations, policy decision or any other undertaking including publication; and (iii) complete and sign the CANUE Data Use and Sharing Agreement (available at http://canue.ca/data/), in which the name and signature of the researcher/analyst who takes responsibility for ensuring all conditions are met.
Data Sharing Restrictions:	These data files are provided solely for the purposes stated in the CANUE Data Sharing and Use Agreement and should not be re-distributed for any reason. These data also contain proprietary postal code data and may only be used for the project named in the CANUE Data Sharing and Use Agreement. Data can be shared only within a project team, with those members who have access to a Research Data Centre (RDC) or are affiliated with an academic institution for the exclusive purposes of teaching, academic research and publishing, and/or planning of educational services in accordance to DMTI End User Agreement associated with the Spatial Mapping Academic Research Tools (SMART) Program.

CANUE	**Canadian Urban Environmental Health Research Consortium** **CANUE Metadata NDVI Landsat V1.0** **2017-10-23**
Required Citation:	Include the following references in any publications resulting from the use of these data: [1] Gorelick, N., Hancher, M., Dixon, M., Ilyushchenko, S., Thau, D., & Moore, R. (2017). Google Earth Engine: Planetary-scale geospatial analysis for everyone. Remote Sensing of Environment. [2] USGS Landsat 5 TM TOA Reflectance (Orthorectified), 1984 to 2011, accessed July 2017 from https://explorer.earthengine.google.com/#detail/LANDSAT%2FLT5_L1T_TOA. [3] USGS Landsat 8 TOA Reflectance (Orthorectified), 2013 to 2017, accessed July 2017 from https://explorer.earthengine.google.com/#detail/LANDSAT%2FLC8_L1T_TOA. [4] Landsat 5 TM Annual Greenest-Pixel TOA Reflectance Composite, 1984 to 2012, accessed July 2017 from https://explorer.earthengine.google.com/#detail/LANDSAT%2FLT5_L1T_ANNUAL_GREENEST_TOA. [5] Landsat 8 Annual Greenest-Pixel TOA Reflectance Composite, 2013 to 2015, accessed July 2017 from https://explorer.earthengine.google.com/#detail/LANDSAT%2FLC8_L1T_ANNUAL_GREENEST_TOA. [6] CanMap Postal Code Suite v2015.2, [computer file] Markham: DMTI Spatial Inc., 2015
Acknowledgment:	Include the following acknowledgements: 1. NDVI metrics, indexed to DMTI Spatial Inc. postal codes , were provided by CANUE (Canadian Urban Environmental Health Research Consortium); 2. Landsat 5 and Landsat 8 TOA data and greenest pixel data were provided by the U.S. Geological Survey and Google respectively, both via Google Earth Engine.