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ABoVE: MODIS-derived Maximum NDVI, Northern Alaska and Yukon Territory for 2002-2017

Get Data

Documentation Revision Date: 2018-09-21

Data Set Version: 1

Summary

This dataset provides the maximum Normalized Difference Vegetation Index (NDVI) at 1-km resolution over northern Alaska, USA and the Yukon Territory, Canada for each year from 2002-2017, as well as a 16 year maximum NDVI product. MODIS products MOD13Q1 and MYD13Q1 from Collection 6 were acquired at 250-m pixel size from June 1-August 30 of each year. Within each growing season from 2002-2017, the maximum NDVI was determined for each pixel. These maximum NDVI values were then aggregated to 1-km by selecting the maximum NDVI from the sixteen 250-m pixels values nested within each 1-km pixel. A long-term 16-year maximum NDVI was then derived from the time series of annual maximum NDVI values.

There are 17 data files in GeoTIFF (.tif) format with this dataset.



Figure 1. Long-term maximum NDVI for the Alaska, USA and the Yukon Territory, Canada study area covering the years 2002-2017.

Citation

Verbyla, D. 2018. ABoVE: MODIS-derived Maximum NDVI, Northern Alaska and Yukon Territory for 2002-2017. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/1614

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1. Data Set Overview

This dataset provides the maximum Normalized Difference Vegetation Index (NDVI) at 1-km resolution over northern Alaska, USA and the Yukon

Territory, Canada for each year from 2002-2017, as well as a 16 year maximum NDVI product. MODIS products MOD13Q1 and MYD13Q1 from Collection 6 were acquired at 250-m pixel size from June 1-August 30 of each year. Within each growing season from 2002-2017, the maximum NDVI was determined for each pixel. These maximum NDVI values were then aggregated to 1-km by selecting the maximum NDVI from the sixteen 250-m pixels values nested within each 1-km pixel. A long-term 16-year maximum NDVI was then derived from the time series of annual maximum NDVI values.

Project: Arctic-Boreal Vulnerability Experiment

The Arctic-Boreal Vulnerability Experiment (ABoVE) is a NASA Terrestrial Ecology Program field campaign based in Alaska and western Canada between 2016 and 2021. Research for ABoVE links field-based, process-level studies with geospatial data products derived from airborne and satellite sensors, providing a foundation for improving the analysis and modeling capabilities needed to understand and predict ecosystem responses and societal implications.

Acknowledgements:

This research was funded under NASA grant number NNX15AU21A

2. Data Characteristics

Spatial Coverage: Northern Alaska and Yukon Territory, Canada

ABoVE Reference Locations:

Domain: Core ABoVE

State/territory: Alaska and Yukon Territory, Canada

Spatial resolution: 1 km

Temporal coverage: 2002-06-01 to 2017-08-30

Temporal resolution: Annual and long-term (16 year) maximum

Study Areas (All latitude and longitude given in decimal degrees)

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
Alaska and Canada	-175.763	-97.9319	68.96583	52.16944

Data file information and description

There are 17 data files in GeoTIFF (.tif) format with this dataset. Sixteen files provide maximum NDVI at 1-km resolution over northern Alaska, USA and the Yukon Territory, Canada for each year from 2002-2017, and one file contains the long-term (2002-2017) maximum NDVI in each 1-km pixel.

Scale Factor: The maximum NDVI values reported here are scaled by a factor of 10,000, thus values range from 2000 (representing NDVI = 0.2) to greater than 9000 (representing NDVI values > 0.9).

Fill value: Pixel values of -1 represent missing data due to unvegetated conditions (NDVI < 0.2), fill pixels, or pixels contaminated by cloud and cloud shadow.

The file names and summary of the NDVI data values are provided in the table below.

Table 1. Properties of the GeoTIFF files.

File name	Minimum value	Maximum value	Mean	Std deviation
long_term_max_NDVI.tif	2001	9996	7972	1109.9
max_NDVI_2002.tif	2001	9996	7459.2	991.4
max_NDVI_2003.tif	2001	9996	7481.3	986.5
max_NDVI_2004.tif	2001	9995	7468.8	1004.8
max_NDVI_2005.tif	2001	9994	7388.3	1005
max_NDVI_2006.tif	2001	9996	7515.3	975.3
max_NDVI_2007.tif	2001	9995	7555.7	959.8
max_NDVI_2008.tif	2001	9994	7514.6	955.3
max_NDVI_2009.tif	2001	9993	7371.2	958.5
max_NDVI_2010.tif	2001	9995	7422	975.2
max_NDVI_2011.tif	2001	9994	7510.5	948.2
max_NDVI_2012.tif	2001	9995	7568.9	930.4
max_NDVI_2013.tif	2001	9995	7682.2	982.9
max_NDVI_2014.tif	2001	9994	7503	945.6
max_NDVI_2015.tif	2001	9996	7563.9	1042.3

max NDVL 2016 tif	2001	0005	7605 6	052.2
111ax_11DV1_2010.tll	2001	3333	7005.0	355.5
max NDVI 2017.tif	2001	9966	7512.9	1053

Projection information

PROJCS: NAD 1983 Alaska Albers,

DATUM: North American Datum 1983

SPHEROID GRS 1980,6378137,298.2572221010042

AUTHORITY: EPSG, 7019, AUTHORITY: EPSG, 6269

PRIMEM: Greenwich ,0

UNIT: degree, 0.0174532925199433

AUTHORITY: EPSG 4269

PROJECTION: Albers Conic Equal Area

PARAMETER: standard parallel 1, 55

PARAMETER: standard parallel 2, 65

PARAMETER: latitude of center, 50

PARAMETER: longitude of center, -154

PARAMETER: false easting, 0

PARAMETER: false northing, 0

AUTHORITY: EPSG 9001

3. Application and Derivation

NDVI is the most widely used proxy for vegetation cover and productivity. The long-term trend in maximum NDVI in the Arctic may indicate responses of that ecosystem to climate change.

4. Quality Assessment

Only NDVI values with a MODIS reliability flag of "good quality" or zero were used. Any input 250-m NDVI value less than 0.2 as "unvegetated" or poor quality was excluded. These pixels were assigned a value of -1. There was a strong relationship between maximum NDVI values and elevation for alpine areas within the extent of this dataset.



Figure 2. Example of long term NDVI declining with elevation for four climatic classes of mountain areas in Alaska and western Canada.

5. Data Acquisition, Materials, and Methods

MODIS products MOD13Q1 and MYD13Q1, Collection 6, were acquired at 250-m pixel size from June 1-August 30 each summer from 2002 through 2017 to determine the maximum Normalized Difference Vegetation Index (NDVI) for northern Alaska and the Yukon Territory, Canada. The MODIS global tiles of H10V02, H11V02, and H12V02 were mosaiced and re-projected to the Alaska Albers NAD83 Equal Area Projection at 250-m pixel size. For each summer, 2002-2017, the maximum NDVI was determined for each 250-pixel.



Figure 3. Example of summer maximum NDVI derived from an 8-day time series. In this example, the maximum NDVI of 0.78 for the pixel (black marker symbol) was selected from early July.





Figure 4. Long-term maximum NDVI for a 250-m pixel. In this example, the long-term maximum NDVI (black marker symbol) was 0.87 from 2012 for the pixel.

These long-term NDVI values were then aggregated to 1-km by selecting the maximum NDVI from the sixteen 250-m pixels maximum NDVI values nested within each 1-km pixel.

0.72	0.78	0.71	0.70	
0.77	0.80	0.77	0.81	 0.82
0.75	0.78	0.80	0.75	 0.02
0.79	0.82	0.81	0.81	

Figure 5. Long term maximum NDVI for 1-km pixel size derived from sixteen 250-m pixels.

Scale Factor: Since floating point values require 4-bytes, the NDVI values are scaled as 2-byte integers. The maximum NDVI values at 1-km pixel size are scaled to integer values by 10,000 ranging from 2000 (representing NDVI 0.2) to greater than 9000 (representing NDVI values > 0.9). Pixel values of -1 represent missing data due to unvegetated conditions (NDVI < 0.2), fill pixels, or pixels contaminated by cloud and cloud shadow.

6. Data Access

These data are available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

ABoVE: MODIS-derived Maximum NDVI, Northern Alaska and Yukon Territory for 2002-2017

Contact for Data Center Access Information:

• E-mail: uso@daac.ornl.gov

• Telephone: +1 (865) 241-3952

7. References

None provided.

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