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ABOVE: Last Day of Spring Snow, Alaska, USA, and Yukon Territory, Canada, 2000-2016

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Documentation Revision Date: 2017-11-09

Data Set Version: 1

Summary

This dataset provides the last day of spring snow cover for most of Alaska and the Yukon Territory for 2000 through 2016. The data are based on the MODIS daily snow cover fraction product (MODSCAG) and are provided at 500-m resolution. Pixels in the daily snow cover fraction grids from April 1 through July 31 were flagged as "Snow" if the snow fraction exceeded 0.15, resulting in a time series of binary daily snow cover grids for each year. The annual last day of spring snow for each pixel was identified by day of the year ranging from 91 (April 1) to 183 (July 2).

This dataset contains 17 files in GeoTIFF (*.tif) format.



Figure 1. Last day of spring snow coverage for Alaska and the Yukon Territory in 2000.

Citation

Verbyla, D. 2017. ABoVE: Last Day of Spring Snow, Alaska, USA, and Yukon Territory, Canada, 2000-2016. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1528>

Table of Contents

- 1. [Data Set Overview](#)
- 2. [Data Characteristics](#)
- 3. [Application and Derivation](#)
- 4. [Quality Assessment](#)
- 5. [Data Acquisition, Materials, and Methods](#)
- 6. [Data Access](#)
- 7. [References](#)

1. Data Set Overview

This dataset provides the last day of spring snow cover for most of Alaska and the Yukon Territory for 2000 through 2016. The data are based on the MODIS daily snow cover fraction product (MODSCAG) and are provided at 500-m resolution. Pixels in the daily snow cover fraction grids from April 1 through July 31 were flagged as "Snow" if the snow fraction exceeded 0.15, resulting in a time series of binary daily snow cover grids for each year. The annual last day of spring snow for each pixel was identified by day of the year ranging from 91 (April 1) to 183 (July 2).

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.

Related Datasets:

O'Leary III, D., D.K. Hall, M. Medler, R. Matthews, and A. Flower. 2017. Snowmelt Timing Maps Derived from MODIS for North America, 2001-2015. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1504>

Acknowledgements:

This study was funded by NASA's Arctic-Boreal Vulnerability Experiment (Grant number: NNX15AV86A).

2. Data Characteristics

Spatial Coverage: Alaska and Yukon Territory

ABoVE Grid Location:

- Domain: Core ABoVE
- State/territory: parts of Alaska and Yukon Territory
- Grid cells: Ah0v0, Ah1v0, Ah0v1, Ah1v1, Ah1v2, Ah2v1, Ah2v2

Spatial Resolution: 500-m

Temporal Coverage: 2000 - 2016

Temporal Resolution: Annual

Study Area (These coordinates are the approximate locations of the study sites. Extents of the data files are provided below. All latitude and longitude values are given in decimal degrees.)

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
Alaska and Yukon Territory	-175.763	-97.949	68.966	52.169

Data File Information

There are 17 data files in GeoTIFF (.tif) format included in this dataset. Each file provides the last day of spring snow cover for each year (2000 - 2016) given in units of day-of-year. Values range from 91 (April 1) to 183 (July 2). Any pixel with snow detected on August 1 was likely from perennial snowfields or glaciers and was coded as NoData (value = 0).

Files are named as follows:

LastDay_SpringSnow_<year>.tif ; e.g. *LastDay_SpringSnow_2000.tif*

Spatial Reference Properties

NAD_1983_Alaska_Albers
WKID: 3338 Authority: EPSG

Projection: Albers
false_easting: 0.0
false_northing: 0.0
central_meridian: -154.0
standard_parallel_1: 55.0
standard_parallel_2: 65.0
latitude_of_origin: 50.0
Linear Unit: Meter (1.0)

Geographic Coordinate System: GCS_North_American_1983
Angular Unit: Degree (0.0174532925199433)
Prime Meridian: Greenwich (0.0)
Datum: D_North_American_1983
Spheroid: GRS_1980
Semimajor Axis: 6378137.0
Semiminor Axis: 6356752.314140356
Inverse Flattening: 298.257222101

Spatial Data Properties

Spatial Representation Type: Raster
Pixel Depth: 16-bit
Pixel Type: unsigned integer
Compression Type: LZW
Number of Bands: 1
Raster Format: TIFF
No Data Value: 0
Scale Factor: 1

3. Application and Derivation

This dataset may be used to examine spatial and temporal trends in annual snow coverage for Alaska and the Yukon Territory.

4. Quality Assessment

Dataset uncertainty was assessed by comparing the estimated spring snowline for mountainous areas against estimates produced from Landsat-8 OLI. Snow pixels were mapped using the Normalized Difference Snow Index (NDSI) for Landsat scenes with less than 10% cloud coverage between May 10-31, 2013-2016. NDSI for Landsat-8 OLI is computed as:

$$NDSI = (Band_3 - Band_6) / (Band_3 + Band_6)$$

where *Band_3* is surface reflectance at 0.525-0.600 μ m and *Band_6* is surface reflectance at 1.56-1.66 μ m.

Pixels were mapped as snow covered when $NDSI > 0.40$, which is a standard threshold. Ten-meter contours were created from an elevation raster. The contour with at least 50% snow cover was selected as the estimated elevation of the spring snowline for that date. For the same date, the MODSCAG (Painter et al. 2009) based regression was used to estimate the elevation of the spring snowline. Estimates of spring snowline elevation from Landsat NDSI and MODSCAG regressions were similar, with a mean difference of 53 meters (stdev = 78 meters).

5. Data Acquisition, Materials, and Methods

This dataset provides the last day of spring snow cover for most of Alaska and the Yukon Territory (MODIS tiles h10v02, h11v02, and h12v02) for 2000 through 2016. The data are based on the MODIS daily snow cover fraction product (MODSCAG; Painter et al. 2009) and are provided at 500-m resolution. Pixels in the daily snow cover fraction grids from April 1 through July 31 were flagged as "Snow" if the snow fraction exceeded 0.15, resulting in a time series of binary daily snow cover grids for each year. The annual last day of spring snow for each pixel was identified by day of the year ranging from 91 (April 1) to 183 (July 2). Any pixel with snow detected on August 1 was likely from perennial snowfields or glaciers and was coded as NoData.

6. Data Access

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

[ABoVE: Last Day of Spring Snow, Alaska, USA, and Yukon Territory, Canada, 2000-2016](#)

Contact for Data Center Access Information:

- E-mail: uso@daac.ornl.gov
- Telephone: +1 (865) 241-3952

7. References

Painter, T.H., K. Rittger, C. McKenzie, P. Slaughter, R.E. Davis, and J. Dozier. 2009. Retrieval of subpixel snow covered area, grain size, and albedo from MODIS. *Remote Sensing of Environment* 113: 868-879. <https://dx.doi.org/10.1016/j.rse.2009.01.001>



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