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DAAC Home > Get Data > NASA Projects > Arctic-Boreal Vulnerability Experiment (ABoVE) > User guide

Understory Vegetation Biomass from Selected Burned and Unburned sites in Alaska

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Documentation Revision Date: 2024-06-14

Dataset Version: 1

Summary

This dataset provides measurements of vegetation biomass from 11 locations across Alaska during 2016 to 2018. Vegetation was harvested from plots that were located at the end of previously established 30-m transects at each site, except at one site where plots were randomly selected. Vascular vegetation was clipped from 50 cm x 50 cm plots, and non-vascular vegetation was clipped from 25 cm x 25 cm plots. All harvested vegetation was sorted by functional group or by species where identification was possible. The sorted vegetation was dried and then weighed to determine biomass. Locations were selected to investigate fire disturbance, to span the range of permafrost regions from continuous to sporadic, and to cover vegetation types from boreal forests, tussock tundra, upland willow/herbaceous scrub, and lowland fen and wet tundra sites across Alaska. The data are provided in comma separated values (CSV) format.

There is one data file in comma separated values (CSV) format with this dataset.



Figure 1. Image showing the understory vegetation at a boreal forest site in interior Alaska (Hess Creek Unburned).

Citation

Minions, C., S. Ludwig, and S. Natali. 2024. Understory Vegetation Biomass from Selected Burned and Unburned sites in Alaska. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/2340>

Table of Contents

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

1. Dataset Overview

This dataset provides measurements of vegetation biomass from 11 locations across Alaska. Vegetation was harvested from plots that were located at the end of previously established 30-m transects at each site, except at one site where plots were randomly selected. Vascular vegetation was clipped from 50 cm x 50 cm plots, and non-vascular vegetation was clipped from 25 cm x 25 cm plots. All harvested vegetation was sorted by functional group or by species where identification was possible. The sorted vegetation was dried and then weighed to determine biomass. Locations were selected to investigate fire disturbance, to span the range of permafrost regions from continuous to sporadic, and to cover vegetation types from boreal forests, tussock tundra, upland willow/herbaceous scrub, and lowland fen and wet tundra sites across Alaska.

These data are part of a larger study to investigate how the magnitudes, fates, and land-atmosphere exchanges of carbon pools are responding to environmental change, and the biogeochemical mechanisms driving these changes. Sites were selected to investigate fire disturbance, to span the range of permafrost regions from continuous to sporadic, and to cover vegetation types from boreal forests, tussock tundra, upland willow/herbaceous scrub, and lowland fen and wet tundra sites across Alaska.

Project: [Arctic-Boreal Vulnerability Experiment](#)

The Arctic-Boreal Vulnerability Experiment (ABoVE) is a NASA Terrestrial Ecology Program field campaign being conducted in Alaska and western Canada, for 8 to 10 years, starting in 2015. 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 to, and societal implications of, climate change in the Arctic and Boreal regions.

Related Datasets

Minions, C., S. Natali, J.D. Watts, and S. Ludwig. 2021. ABoVE: Soil Temperature and VWC at Unburned and Burned Sites Across Alaska, 2016-2022. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1869>

- Soil temperature and volumetric water content data collected at the same sites

Minions, C., S. Natali, J.D. Watts, S. Ludwig, and D. Risk. 2019. ABoVE: Year-Round Soil CO₂ Efflux in Alaskan Ecosystems, Version 2.1. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1762>

- CO₂ Efflux data collected at the same sites

Natali, S., S. Ludwig, C. Minions, and J.D. Watts. 2023. ABoVE: Thaw Depth at Selected Unburned and Burned Sites Across Alaska. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1579>

- Thaw depth measurements collected at the same sites

Acknowledgments

This research was supported by NASA's Terrestrial Ecology: Arctic Boreal Vulnerability Experiment (ABoVE) program (grant NNX15AT81A).

2. Data Characteristics

Spatial Coverage: Alaska, USA

ABoVE Reference Locations

Domain: Core ABoVE

State/Territory: Alaska

Grid Cells: Ah001v000, Bh006v004, Bh006v005, Bh007v005, Bh008v003, Ch036v033, Ch039v032, Ch040v029, Ch042v032, Ch048v019, Ch048v021

Spatial Resolution: multiple points

Temporal Coverage: 2016-08-09 to 2018-07-11 (see Table 3 for site-level dates)

Temporal Resolution: One time samples during June, July, and August.

Study Area: Latitude and longitude are given in decimal degrees.

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
full extent	-150.27978	-146.55757	68.99103	63.87992

Data File Information

There is one data file in comma separated values format with this dataset: [Alaska_Vegetation_Biomass.csv](#)

The file contains measurements of biomass and details about the understory vegetation cover.

Missing numeric data are noted as -9999; missing text data are noted as "NA".

Table 1. Variables in *Alaska_Vegetation_Biomass.csv*.

Column Name	Units/Format	Description
sampling_date	YYYY-MM-DD	Date of sample harvest.

site_name	-	Name of study site where samples were collected.
site_code	-	Abbreviated site name. See codes in Table 2.
transect	-	Transect number: 1 to 3.
meter	m	Meter location along 30 m transect. Most samples were collected at the 0 m and 30 m locations.
burn_history	-	Fire history at the study site.
latitude	decimal degrees	Latitude of transect sample or of general plot location.
longitude	decimal degrees	Longitude of transect sample or of general plot location.
species	-	Abbreviated name of plant species or functional group. See vegetation codes in Table 4.
plot_size	m ²	Area of the harvested plot.
mass	g	Mass of dried sample in grams.
notes	-	Notes regarding the sample.

Table 2. Study site locations.

Site Name (Code)	Latitude	Longitude
Hess Creek Burned (HCB)	65.568762	-148.92344
Hess Creek Unburned (HCU)	65.567389	-148.925157
Nome Creek Burned – Old (NCB-OLD)	65.340087	-146.910072
Nome Creek Unburned – Old (NCU-OLD)	65.285561	-146.560019
Eight Mile Lake (EML)	63.880123	-149.256008
Bonanza Creek (BNZ)	64.695999	-148.325677
Nome Creek Burned – New (NCB-NEW)	65.28603	-146.55833
I-Minus High (IMNH)	68.557159	-149.532908
I-Minus Low (IMNL)	68.5593	-149.51605
Anaktuvuk Burned (AKB)	68.990797	-150.2702
Anaktuvuk Unburned (AKU)	68.929906	-150.2798

3. Application and Derivation

These data are part of a larger study to investigate how the magnitudes, fates, and land-atmosphere exchanges of carbon pools are responding to environmental change, and the biogeochemical mechanisms driving these changes.

4. Quality Assessment

All harvested vegetation was sorted following the same methodology and naming conventions. Any suspect values within the data set were flagged and removed. Any vegetation that could not be confidently identified to species or functional group were listed as 'UNKNOWN'.

5. Data Acquisition, Materials, and Methods

Sites were selected to investigate fire disturbance (USDA, 2023), to span the range of permafrost regions from continuous to sporadic, and to cover vegetation types from boreal forests, tussock tundra, upland willow/herbaceous scrub, and lowland fen and wet tundra sites across Alaska.

Vegetation was harvested from plots at previously established, 30-meter transects at each site, except for one site where plots were randomly selected. Most samples were collected at the 0 m and 30 m locations along transects. Vascular vegetation was clipped from 50 cm x 50 cm plots, and non-vascular vegetation was clipped from 25 cm x 25 cm plots. Clipped vegetation was put into plastic sample bags, and samples were kept frozen until they could be sorted in the lab. All harvested vegetation was sorted into species where identification was possible (Viereck and Little, 2007) or sorted into families and functional groups (ex. Graminoids). The sorted vegetation was dried and then weighed to determine biomass.

Table 3. Site names and descriptions.

Site Name	Sampling Date	Description
Hess Creek Burned	2016-08-09	The site is located just off the Dalton Highway between mile 11 and 12 within a burned boreal black spruce forest (1995).
Hess Creek Unburned	2016-08-09	The site is located just off the Dalton Highway between mile 11 and 12 within an unburned boreal black spruce forest.
Nome Creek Burned – Old	2016-08-10	The site is located within the White Mountain Recreation Area on a south facing slope characterized by willow/herbaceous scrub vegetation which had been previously burned (2004).

Nome Creek Unburned – Old	2016-08-10	The site is located within the White Mountain Recreation Area on a south facing slope characterized by willow/herbaceous scrub vegetation.
Eight Mile Lake	2016-08-11	The site is located off the Stampede Trail in Healy. The area is characterized by moist tundra and sedge/shrub vegetation.
Bonanza Creek	2017-06-08	The site is located near the Bonanza Creek LTER Site within a boreal black spruce stand.
Nome Creek Burned – New	2018-07-07	Located less than a 1 km off the Steese Highway near mile 63. The station is in a burned area (2004), and the vegetation is characterized by willow/herbaceous scrub.
I-Minus High	2016-08-18	The site is located approximately 1-km off the Dalton Highway a few miles south of Toolik Field Station. The station is located on top of a hillside and is characterized by tussock tundra.
I-Minus Low	2018-07-10	The site is located approximately 1-km off the Dalton Highway, a few miles south of Toolik Field Station. The station is in a lowland, wet sedge fen area (Riparian).
Anaktuvuk Burned	2018-07-11	Located near the Anaktuvuk river north of Toolik field station within the severely burned area of the 2007 Anaktuvuk river fire. The vegetation is characterized by moss and tussock tundra.
Anaktuvuk Unburned	2018-07-11	Located in an undisturbed area near the Anaktuvuk river north of Toolik field station. The vegetation at the site is characterized by moss and tussock tundra.

Table 4. Vegetation classification.

Vegetation Code	Name	Common Name/Description
BENA	<i>Betula nana</i>	Dwarf birch. Low, spreading deciduous shrub. Leaves are thick and leathery, often having fine, wavy teeth. Twigs are resinous and slightly hairy.
CHCA	<i>Chamaedaphne calyculata</i>	Leatherleaf. Evergreen Shrub. Leaves are wide, thick and leathery, and oblong in shape. Surface of leaves are dark green in color. Twigs are light to dark brown in color.
COST	<i>Cornus stolonifera</i>	American dogwood. Deciduous shrub. Leaves are broadly ovate to oblong in shape, and dull green in color. Branches are dark red. Cluster flowers that are white.
DAFR	<i>Dasiphora fruticosa</i>	Bush (shrubby) cinquefoil. Deciduous shrub with yellow flowers. Alternate, pinnate leaves that are narrowly oblong and dull green in color.
EMNI	<i>Empetrum nigrum</i>	Crowberry. Evergreen, creeping, mat-forming subshrub. Shiny green leaves and has bright red berries.
EPAN	<i>Epilobium angustifolium</i>	Fireweed. Perennial forb with tall, leafy stems. Plant may have 15 or more flowers that are pinky-purple in color.
EQUIS	<i>Equisetum spp.</i>	Horsetail. Have round, jointed stems. They are grass-like in appearance.
FORB	Forbs	Various forb species. Forbs are herbaceous flowering plant species.
GRAM	Graminoids	Herbaceous plants with grass-like morphology. Leaves are generally long and linear in form (ex. <i>Eriophorum vaginatum</i> – tussock)
LICH	Lichens	All types of lichen present within the sample plot (ex. reindeer lichen, trumpet lichen, finger lichen, etc.). Did not separate into species.
LITTER	Litter	Litter material – various. Includes small sized plant material that is not identifiable.
MOSS	Moss & Liverworts	All types of moss and liverworts (bryophytes) present within a sample plot. Did not separate into species.
OXMI	<i>Oxycoccus microcarpus</i>	Bog cranberry (also <i>Vaccinium oxycoccos</i>). Evergreen shrub. Small, vine-like with very slender stems and green lance-shaped leaves. Has red, juicy berries.
PEPA	<i>Petasites frigidus v. palmatus</i>	Arctic sweet coltsfoot. Low-growing perennial with white cluster flowers, and large basal leaves. Leaves can be deeply clefted into palmate leaflets.
PIGL	<i>Picea glauca</i>	White spruce. Type of coniferous tree prevalent across Alaska. Seedling stage.
RHSU	<i>Rhododendron subarcticum</i>	Labrador tea (also <i>Ledum Palustre</i>). Evergreen shrub with narrow oblong leaves and upright branches. Leaves are fragrant, leathery, dark green colored on the upper surface and reddish-brown on the underside.
ROAC	<i>Rosa acicularis</i>	Prickly Rose. Deciduous shrub. Main stems are usually covered with prickles. Alternate, pinnate leaves with mostly 5 leaflets. Flowers are pink in color.
RUCH	<i>Rubus chamaemorus</i>	Cloudberry. Herbaceous perennial forb with green leaves that are 1 to 3 inches. Has aggregate fruits that are composed of 6 to 18 large drupelets and are often orange in color.
SASP	<i>Salix spp.</i>	Willow species. Willows were not identified to the species levels. Deciduous shrubs usually having narrow leaves with slender or wiry twigs. Catkins are upright or slightly spreading.
Freckle Pelt	<i>Peltigera spp.</i>	Type of lichen commonly known as freckle pelt. Characterized by a large thallus. Green in color becoming pale as it dries.
UNKNOWN	Unknown spp.	Unknown species. Could not be identified based on visual inspection.

VAUL	<i>Vaccinium uliginosum</i>	Bog blueberry. Deciduous shrub that is low and highly branched. Twigs are brown and slender with leaves that are oval and leathery. Has berries that are blue to black in color.
VAVI	<i>Vaccinium vitis-idaea</i>	Lingonberry. Evergreen shrub that is low, creeping and mat-forming. Has shiny, thick, oval-shaped green leaves and bright red berries.

6. Data Access

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

[Understory Vegetation Biomass from Selected Burned and Unburned sites in Alaska](#)

Contact for Data Center Access Information:

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

7. References

Minions, C., S. Natali, J.D. Watts, and S. Ludwig. 2021. ABoVE: Soil Temperature and VWC at Unburned and Burned Sites Across Alaska, 2016-2022. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1869>

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About Us

Mission
Data Use and Citation
Policy
User Working Group
Partners

Get Data

Science Themes
NASA Projects
All Datasets

Submit Data

Submit Data Form
Data Scope and
Acceptance
Data Authorship Policy
Data Publication Timeline
Detailed Submission
Guidelines

Tools

TESVIS
THREDDS
SDAT
Daymet
Airborne Data Visualizer
Soil Moisture Visualizer

Resources

Learning
Data Management
News

Help

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