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ABoVE: Post-Fire and Unburned Field Site Data, Anaktuvuk River Fire Area, 2008-2017

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Dataset Version: 1

Summary

This dataset includes field measurements from 26 burned and unburned transects established in 2008 in the region of the Anaktuvuk River tundra fire on the Arctic Slope of Alaska, US. Measurements include plant cover by species, shrub and tussock density, thaw depth, and soil depth. This wildfire occurred in 2007, and sampling took place in 2008-2011 and in 2017.

This dataset includes six files in comma-separated values (CSV) format.

Figure 1: The 2007 Anaktuvuk River fire burned across riparian stringers and wet channels around high-centered polygons that are typically left as unburned inclusions. (2008 photo by D. Yokel). Source: Jandt et al., 2012.

Citation

Miller, E.A., R. Jandt, C.A. Baughman, B.M. Jones, and D.A. Yokel. 2022. ABoVE: Post-Fire and Unburned Field Site Data, Anaktuvuk River Fire Area, 2008-2017. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/2119

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1. Dataset Overview

This dataset includes field measurements from 26 burned and unburned transects established in 2008 in the region of the Anaktuvuk River tundra fire on the Arctic Slope of Alaska, US. Measurements include plant cover by species, shrub and tussock density, thaw depth, and soil depth. This wildfire occurred in 2007, and sampling took place in 2008-2011 and in 2017.

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 Publications

Jandt, R.R., E.A. Miller, D.A. Yokel, M.S. Bret-Harte, C.A. Kolden, and M.C. Mack. 2012. Findings of Anaktuvuk River Fire recovery study 2007-2011. Unpublished report to the Bureau of Land Management; Fairbanks, Alaska, USA.
https://www.frames.gov/sites/default/files/AFSC/Anaktuvuk_River_Fire_Study_FINAL_6-21-12.pdf

Jandt, R.R., E.A. Miller, and B.M. Jones. 2021. Fire Effects 10 Years After the Anaktuvuk River Tundra Fires. BLM Alaska Technical Report #64. Bureau of Land Management; Anchorage, Alaska, USA.
https://www.blm.gov/sites/default/files/docs/2021-06/BLM_AK_TR_64.pdf

Acknowledgements

2. Data Characteristics

Spatial Coverage: Arctic Slope of Alaska, U.S.

>**ABoVE Reference Locations**
>**Domain**: Core Region
>**State/Territory**: Alaska
>**Grid cells**: Ah001v000, Bh008v002, Bh008v003, Ch048v017, Ch048v018, Ch048v019, Ch049v017, Ch049v018, Ch049v019

Spatial Resolution: Measurements compiled along 50-m transects

Temporal Coverage: 2008-07-03 to 2017-07-23

Temporal Resolution: Annual measurements 2008 to 2011 and in 2017

Study Area:

Latitude and longitude are given in decimal degrees.

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
Arctic Slope of Alaska, U.S.	-151.177	-150.030	69.360	69.018

Data File Information

This dataset includes six files in comma-separated values (CSV) format.

Missing data are denoted by the value -9999 in numeric fields and "NA" for text fields.

Table 1. Variables in *BLM_Anaktuvuk_events.csv*.

Variables	Units	Description
id	1	Record ID number
foreignID	1	Field to link to records in *BLM_Anaktuvuk_point_intercept.csv*, *BLM_Anaktuvuk_shrub_density.csv*, *BLM_Anaktuvuk_soils.csv*, and *BLM_Anaktuvuk_tussock_counts.csv*
Transect		Transect label
Date	YYYY-MM-DD hh:mm:ss	Date of sampling
Staff1, ..., Staff5		Person(s) involved in data collection.
pH_mean_organic	pH	Mean of pH for samples of soils above the organic-mineral interface along transect
pH_mean_mineral	pH	Mean of pH for samples of soils below the organic-mineral interface along transect
Notes		Notes regarding field data collection or site conditions

Table 2. Variables in *BLM_Anaktuvuk_point_intercept.csv*.

Variables	Units	Description
id	1	Record ID number
foreignID	1	Field to link to records in *BLM_Anaktuvuk_events.csv*
Transect		Transect label
Date	YYYY-MM-DD hh:mm:ss	Date of sampling
Point	1	Point label

Tallest	binary	Binary indicator (1 = "yes") of tallest species present. This field was used for ground-truthing remotely sensed imagery.
NRCS_Code		Species code from the United States Department of Agriculture Natural Resources Conservation Service PLANTS database (https://plants.sc.egov.usda.gov)
Genus		Genus
Species		Species
Note		Notes regarding field data collection or site conditions

Table 3. Variables in *BLM_Anaktuvuk_shrub_density.csv*.

Variables	Units	Description
id	1	Record ID number
foreignID	1	Field to link to records in *BLM_Anaktuvuk_events.csv*
Transect		Transect label
Date	YYYY-MM-DD hh:mm:ss	Date of sampling
Quadrat	1	Quadrat label
NRCS_Code		Species code from the United States Department of Agriculture Natural Resources Conservation Service PLANTS database (https://plants.sc.egov.usda.gov)
Genus		Genus
Species		Species
HeightClass	1	Height classes: 1 = <20 cm, 2 = 20-150 cm, 3 = >150 cm
LifeStage		Stages: Mature, Resprout, Seedling. This field is most relevant to the first sampling (2008) when vegetation colonized by seed or resprouted from underground structures.
Dead	binary	Binary: whether shrub is dead: 0 = "no", 1 = "yes"
Count	1	Count of individual shrubs
Notes		Notes regarding field data collection or site conditions

Table 4. Variables in *BLM_Anaktuvuk_sites.csv*.

Variables	Units	Description
Transect information		
id	1	Record ID number
Unit		"BLM"
Transect		Transect label: Labels beginning with "B" indicate burned area. Labels beginning with "U" indicate unburned area.
Transect_Type		"Burned" or "Unburned"
LatitudeOrigin	degrees_north	Latitude coordinate for transect origin stake (0 m mark)
LongitudeOrigin	degrees_east	Longitude coordinate for transect origin stake (0 m mark)
TransectAzimuth	degrees	The azimuth of the transect, normally 90 degrees, with 21 degrees declination to east.
TransectDeclination	degrees	Declination from geographic north, normally 21 degrees east.
Elevation	m	Transect elevation
LatitudeEnd	degrees_north	Latitude coordinate for transect end stake (50 m mark)
LongitudeEnd	degrees_east	Longitude coordinate for transect end stake (50 m mark)
LatitudeCBI	degrees_north	Latitude coordinate for the Composite Burn Index plot center
LongitudeCBI	degrees_east	Longitude coordinate for the Composite Burn Index plot center
AspectCBI		Aspect of the Composite Burn Index plot center
ElevationCBI	m	Elevation of the Composite Burn Index plot center
PercentBurned30mRadius	percent	Percent of the Composite Burn Index plot, within 30 m of plot center, that burned

Variables recorded on the Composite Burn Index (CBI) field datasheet Values of 0 to 3.0 are CBI rating factor scores as defined on field datasheet. Values >3 are observed values in the units listed. Refer to Appendix B, pp 30-31 in Jandt et al. (2012) for details.		
SubstratePreFireCoverLitter	percent	Percent cover estimates
SubstratePreFireCoverDuff	percent	
SubstratePreFireCoverSoilRock	percent	
SubstratePreFireCoverTussocks	percent	
DepthPreFireLitter	inches	Substrate depth estimates
DepthPreFireDuff	inches	
DepthPreFireFuelBed	inches	
SubstrateLitterDeadGrass1HrConsumed	percent	Substrates affected or consumed by fire
SubstrateDuff	percent	
SubstrateMediumWoodyTussockBasalArea	percent	
SubstrateExposedMineral	percent	
GroundLayerPreFireCoverHerbGram	percent	Estimates of pre-fire cover
GroundLayerPreFireCoverMossLichen	percent	
GroundLayerPreFireCoverShrub	percent	
GroundLayerMossLichen	percent	Fire effects on ground-level vegetation
GroundLayerFoliageAltered	percent	
GroundLayerFrequencyLiving	percent	
GroundLayerColonizers	percent	
GroundLayerCompositionAbundance	percent	
UpperLayerPreFireCover	percent	Fire effects on vegetation above ground level
UpperLayerFoliageAltered	percent	
UpperLayerFrequencyLiving	percent	
UpperLayerColonizers	percent	
UpperLayerCompositionAbundance	percent	
CBIMemo		Notes on the Composite Burn Index plot
Additional information about transect		
Aspect	degrees	Terrain aspect at transect
Slope	percent	Terrain slope at transect
dNBR_Class_Value	1	Differenced Normalized Burn Ratio class and pixel values. See Kolden (2010) and Jandt et al. (2012).
dNBR_Pixel_Value	1	
BurnDateEnd	YYYY-MM-DD hh:mm:ss	Estimated earliest date and time the transect burned
BurnDateBegin	YYYY-MM-DD hh:mm:ss	Estimated latest date and time the transect burned
Polygons		Denotes whether transect includes permafrost polygons: "HCP" = high center polygon, "LCP" = low center polygon, "None" = no polygons, or "Other" = other conditions.
Memo		Notes about transect characteristics

Table 5. Variables in *BLM_Anaktuvuk_soils.csv*.

Variables	Units	Description
id	1	Record ID number
foreignID	1	Field to link to records in *BLM_Anaktuvuk_events.csv*
Transect		Transect label
Date	YYYY-MM-DD hh:mm:ss	Date of sampling
Point	1	Point along transect

ThawDepth	cm		Observed thaw depth
Rock	binary		Binary: "1" if soil probe hit rock instead of frozen soil
OrganicDepth	cm		Depth of whole organic layer
OrganicDepthIce	binary		Binary: "1" = whole organic layer could not be measured due to frozen soil
Comment			Notes on soil sampling or conditions

Table 6. Variables in *BLM_Anaktuvuk_tussock_counts.csv*.

Variables	Units	Description
id	1	Record ID number
foreignID	1	Field to link to records in *BLM_Anaktuvuk_events.csv*
Transect		Transect label
Date	YYYY-MM-DD hh:mm:ss	Date of sampling
Quadrat	1	Quadrat label
Species		Species code: "ERIVAG" = Eriophorum vaginatum, "CARBIG" = Carex bigelowii, "UNKNOWN" = other graminoid species
Count	1	Number of tussocks in 1-m^2 quadrat
Dead	binary	Binary: whether tussock were dead: 0 = "no", 1 = "yes"
Notes		Notes on sampling or conditions

3. Application and Derivation

These data provide information on the impacts of fire on tundra ecosystems and recovery after fire disturbance.

4. Quality Assessment

None provided.

5. Data Acquisition, Materials, and Methods

In 2007, the Anaktuvuk River Fire burned tundra ecosystems on the Arctic Slope in northern Alaska. This fire's extent and severity was substantially higher than other recorded fires in this region. An interdisciplinary team assessed fire effects, including burn severity, potential plant community shifts, and effects on permafrost and active layers. Field sampling took place in 2008-2011 and in 2017.

A set of 26 burned and unburned transects were established in 2008 to span the range of vegetation types and burn severities. The transects were 50 m long, oriented west (origin) to east (terminus). Measures of plant cover by species, shrub and tussock density were collected every 0.5 m (n=100 per transect). Observers measured cover of substrate or vegetation at 100 points along each transect using a point-sighting device and evaluated shrub and tussock density in ten 1-m^2 frames along the transect. Percent cover was calculated as the sum of all hits of a species along the 50-m transect, disregarding multiple hits on the same species at one point. Soil depth and active layer thickness (thaw depth) were measured every 2.5 m (n=20) along a transect parallel to that used for vegetation sampling. Five soil cores were collected for each transect to chemical characteristics of the organic and mineral soil horizons.

To map burn severity and extent, the Differenced Normalized Burn Ratio class (dNBR) (Key and Benson, 2006) was measured from Landsat 5 TM on 2008-06-14. The Normalized Burn Ratio (NBR) is calculated from a single, atmospherically corrected, post-fire image as:
NBR = (B4 – B7) / (B4 + B7) * 1000, where B represents different bandwidths detected. Field observations of fire impacts on vegetation were gathered in plots associated with the transects to compute a modified Composite Burn Index (CBI (Key and Benson, 2006). The CBI was used to calibrate the dNBR metrics (Kolden, 2010). These circular CBI plots had a 30-m radius and were centered on the starting point (origin) of each transect. An overall burn severity rating is derived from an average of ratings for assessments in three fuel layers: substrate, low vegetation, and tall shrubs.

See Jandt et al. (2012) and Jandt et al. (2021) for further details about the field methods and findings of this study.
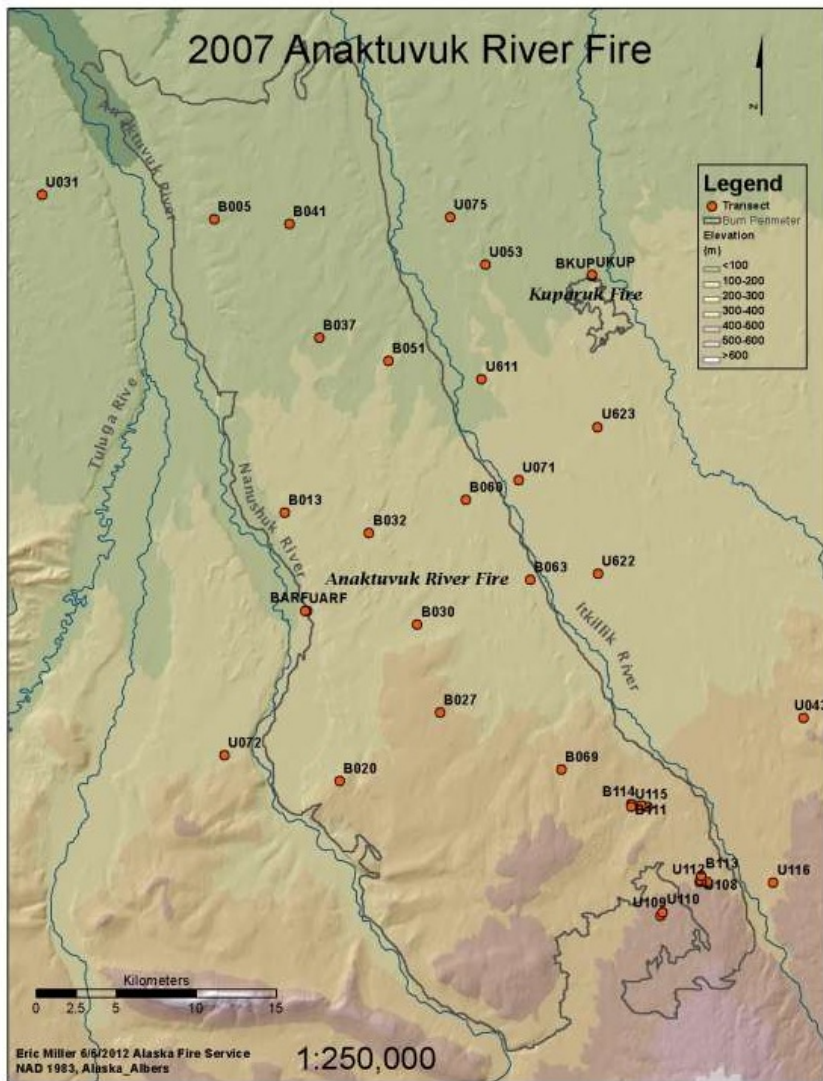
Figure 2: Locations of permanent transects established in to monitor ecosystem impacts of the 2007 Anaktuvuk River Fire. The study area is on the Arctic Slope of northern Alaska (latitude 69.05, longitude -150.84). Labels indicate burn status of each transect by first letter: "B" = burned, "U" = unburned reference. Source: Jandt et al., 2012.

6. Data Access

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

ABoVE: Post-Fire and Unburned Field Site Data, Anaktuvuk River Fire Area, 2008-2017

Contact for Data Center Access Information:

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

7. References

Key, C.H., and N.C. Benson. 2006. Landscape assessment: ground measure of severity, the composite burn index, and remote sensing of severity, the normalized burn ratio. In D.C. Lutes, R.E. Keane, J.F. Caratti, C.H. Key, N.C. Benson, S. Sutherland, and L.J. Gangi (eds.). FIREMON: Fire Effects Monitoring and Inventory System. General Technical Report RMRS-GTR-164-CD: LA1–LA51. USDA Forest Service, Rocky Mountain Research Station; Ogden, Utah, U.S. https://www.fs.usda.gov/rm/pubs_series/rmrs/gtr/rmrs_gtr164.pdf

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