Burned and Unburned Field Site Data, Noatak, Seward, and North Slope, AK, 2016-2018

Get Data

Documentation Revision Date: 2022-03-21

Dataset Version: 1

Summary

This dataset includes field measurements from unburned and burned 10 m x 10 m and 1 m x 1 m plots in the Noatak, Seward, and North Slope regions of the Alaskan tundra during July through August in the years 2016-2018. The data include vegetation coverage, soil moisture, soil temperature, soil thickness, thaw depth, and weather measurements. Measurements were recorded using ocular assessments and standard equipment. Plot photographs are included.

Potential field sites were determined *a priori* using a suite of fire indices and topographic variables. Burned and unburned areas were identified within fire perimeters recorded in the Alaska Large Fire Database (ALFD), and Landsat satellite imagery data was used to calculate indices of fire severity. The final set of sites were selected using a stratified random sampling scheme.

There are 7 data files included in this dataset; 1 file in comma-separated values (*.csv) format, 3 files in Keyhole Markup Language (*.kml) format, and 3 files in Portable Document Format (*.pdf).

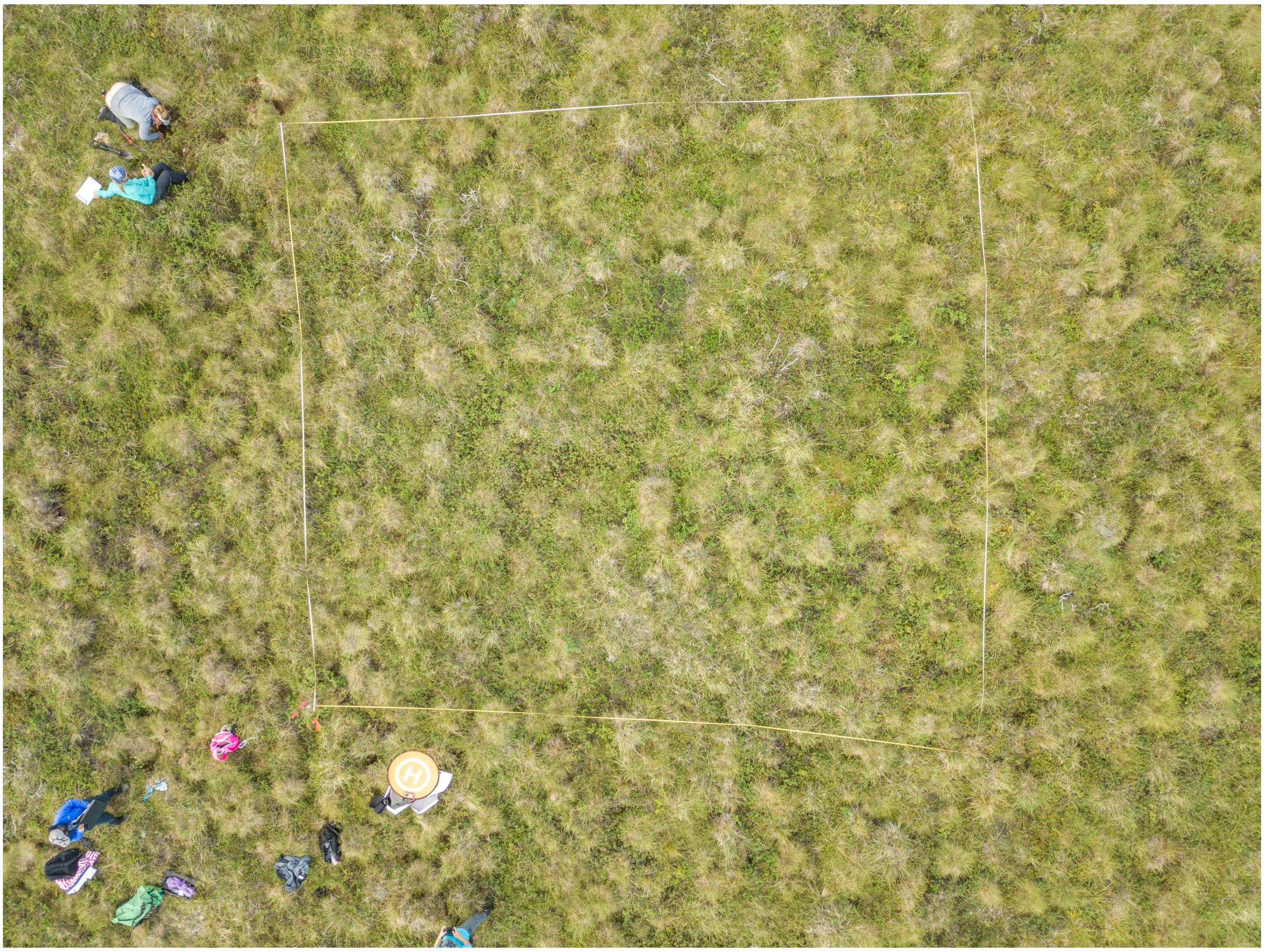

Figure 1. Researchers at a field site in the Seward Peninsula during 2017.

Citation

Loboda, T.V., L.K. Jenkins, D. Chen, J. He, and A. Baer. 2022. Burned and Unburned Field Site Data, Noatak, Seward, and North Slope, AK, 2016-2018. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/1919

Table of Contents

1. Dataset Overview

This dataset includes field measurements from unburned and burned 10 m x 10 m and 1 m x 1 m plots in the Noatak, Seward, and North Slope regions of the Alaskan tundra during July through August in the years 2016–2018. The data include vegetation coverage, soil moisture, soil temperature, soil thickness, thaw depth, and weather measurements. Measurements were recorded using ocular assessments and standard equipment. Plot photographs are included.

Potential field sites were determined *a priori* using a suite of fire indices and topographic variables. Burned and unburned areas were identified within fire perimeters recorded in the Alaska Large Fire Database (ALFD), and Landsat satellite imagery data was used to calculate indices of fire severity. The final set of sites were selected using a stratified random sampling scheme.

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

He, J., D. Chen, L. Jenkins, and T.V. Loboda. 2021. Impacts of wildfire and landscape factors on organic soil properties in Arctic tussock tundra. Environmental Research Letters 16:085004. https://doi.org/10.1088/1748-9326/ac1192

He, J., Loboda, T. V., Jenkins, L., Chen, D. 2019. Mapping fractional cover of major fuel type components across Alaskan tundra. Remote Sensing of Environment 232:111324. https://doi.org/10.1016/j.rse.2019.111324

Acknowledgment

This research was funded by the NASA Arctic-Boreal Vulnerability Experiment (ABoVE) program (grant NNX15AT79A).

2. Data Characteristics

Spatial Coverage: Noatak, Seward, and North Slope regions of the Alaskan tundra, U.S.

ABoVE Reference Locations

Domain: Core ABoVE

State/Territory: Alaska

Grid cells: Ch036v010, Ch038v011, Ch038v012, Ch037v011, Ch036v009, Ch035v009, Ch036v011, Ch025v011, Ch024v011, Ch050v019, Ch051v019, Ch052v018, Ch050v020

Spatial Resolution: Point measurements at 10 x 10- m and 1 x 1 m plots

Temporal Coverage: 2016-07-22 to 2018-08-27

Temporal Resolution: One and two-time estimates

Study Area: All latitude and longitude are given in decimal degrees. These coordinates are the approximate locations of the study sites and may not match the extent of the data files.

Site	Northern Extent	Southern Extent	Eastern Extent	Western Extent
Noatak, Seward, North Slope regions, Alaska	69.663	65.018	-148.640	-164.929

Data File Information

There are 7 data files included in this dataset; 1 file in comma-separated values (*.csv) format, 3 files in Keyhole Markup Language (*.kml) format, and 3 files in Portable Document Format (*.pdf).

Table 1. File names and descriptions.

File Name	Description
Plot_Data_Noatak_Seward_Alaska.csv	Provides vegetation percent coverage, environmental conditions, weather descriptions, wind, and temperature data, as well as soil temperature, thaw depth, and soil moisture measurements (Table 1). Missing numeric data are represented by "-9999", and missing text values are represented by "NA".
YYYY_field_photos.kml	Georeferenced photographs of the study sites for each of the years 2016, 2017, and 2018. In the names of these files, **YYYY** is either 2016, 2017, or 2018.
YYYY_field_photos.pdf	Images and metadata for each study site. In the names of these files, **YYYY** is either 2016, 2017, or 2018. Within the files, information can be matched to data provided in the file Plot_Data_Noatak_Seward_Alaska.csv (for fields *photo_north*, *photo_south*, *photo_east*, *photo_west*, *photo_nadir*, and *photo_other*) by the name IMGP0**aaa**.JPG, where **aaa** is the ID number.

Data File Details

Table 2. Variable names and descriptions in the file Plot_Data_Noatak_Seward_Alaska.csv.

Variable	Units	Description
site_name	text	Field site ID for 10 m x 10 m plots and transect locations
site_type	text	Burned or unburned types as recorded by the Alaskan Large Fire Database
geographic_region	text	NOAT: Noatak River Valley; SEWP: Seward Peninsula; NS: North Slope
fire_frequency	text	Fire frequency based on fire perimeters and verified, where possible, with satellite imagery. Burned sites have a value of ≥ and unburned sites have a value 0.
fire1_year	YYYY	The most recent year of fire occurrence
fire1_bsi	text	Burn Severity Index (bsi) for the most recent year of fire occurrence, values include: 1 (very low), 2 (moderate), 3 (high), 4 (severe)
fire2_year	YYYY	The second most recent year of fire occurrence
fire2_bsi	text	Burn Severity Index (bsi) for the second most recent year of fire occurrence, values include: 1 (very low), 2 (moderate), 3 (high), 4 (severe)
fire3_year	YYYY	The third most recent year of fire occurrence
fire3_bsi	text	Burn Severity Index (bsi) for the third most recent year of fire occurrence, values include: 1 (very low), 2 (moderate), 3 (high), 4 (severe)
fire4_year	YYYY	The fourth most recent year of fire occurrence
fire4_bsi	text	Burn Severity Index (bsi) for the fourth most recent year of fire occurrence, values include: 1 (very low), 2 (moderate), 3 (high), 4 (severe)
measurement_year	YYYY	Data collection year
measurement_date	YYYY-MM-DD	Data collection date
measurement_hour	HH	Data collection hour (local time)
measurement_time	HH:MM:SS	Data collection time (local time)
latitude	Decimal degrees	Latitude of the southeast (SE) corner of the site (10 x 10-m plot)
longitude	Decimal degrees	Longitude of the SE corner of the site (10 x 10-m plot)
site_description	text	General description of the 10 m x 10 m site (e.g. vegetation distribution, drainage, topography, etc.)
weather_current	text	Description of weather conditions during data collection
weather_past_12hr	text	Description of weather conditions during the past 12 hours before data collection
rain	text	Binary data representing the occurrence of rain: 1 (yes) or 0 (no)
drainage	text	Drainage types, values include: 1 (flat-poorly drained), 2 (flat-drained), 3 (moderately-drained), 4 (well-drained). The values were created through a combination of elevation, slope, flow accumulation, and ideas described in (Kasischke and Hoy, 2012).
air_temp	degrees C	Air temperature at 2 m above the surface for 1 m x 1m plots and transect points
rh	%	Relative humidity at 2 m above the surface for 1 m x 1m plots and transect points
dew_temp	degrees C	Dew point temperature at 2 m above the surface for 1 m x 1m plots and transect points
wind_speed	m/s	Wind speed for 1 m x 1m plots and transect points
wind_direction	Degree	Wind direction (360 degrees with 0 at N) for 1 m x 1m plots and transect points
moss_percent_cover	%	Percent cover of moss within the 10 m x 10 m plot estimated via ocular assessment
moss_cover_flag		Flag column to indicate where moss cover percentage is <1 or other text note
moss_distribution	text	General description of the spatial distribution of moss within the 10 m x 10 m plot
lichen_percent_cover	%	Percent cover of lichen within the 10 m x 10 m plot estimated via ocular assessment
lichen_cover_flag		Flag column to indicate where lichen cover percentage is <1 or other text note
lichen_distribition	text	General description of the spatial distribution of lichen within the 10 m x 10 m plot
grass_percent_cover	%	Percent cover of grass within the 10 m x 10 m plot estimated via ocular assessment
grass_distribution	text	General description of the spatial distribution of grass within the 10 m x 10 m plot
sedge_percent_cover	%	Percent cover of sedge within the 10 m x 10 m plot estimated via ocular assessment
sedge_cover_flag		Flag column to indicate where sedge cover percentage is <1 or other text note

sedge_distribution	text	General description of the spatial distribution of sedge within the 10 m x 10 m plot
shrub_percent_cover	%	Percent cover of shrub within the 10 m x 10 m plot estimated via ocular assessment
shrub_height	cm	Mean height of shrubs at the 10 m x 10 m plot
shrub_distribution	text	General description of the spatial distribution of shrub within the 10 m x 10 m plot
char_percent_cover	%	Percent cover of char within the 10 m x 10 m plot estimated via ocular assessment
char_cover_flag		Flag column to indicate where char cover percentage is <1 or other text note
char_distribution	text	General description of the spatial distribution of char within the 10 m x 10 m plot
other_ground_cover_type	text	A different ground cover type other than measured, if any
other_ground_cover_percent_cover	%	Percent cover of the type, if any
other_cover_flag		Flag column to indicate where other cover percentage is <1 or other text note
other_ground_cover_height	cm	Height of the species of the type, if any
other_distribution	text	Spatial distribution of the type, if any
other2_ground_cover_type	text	A second ground cover type other than measured, if any
other2_ground_cover_percent_cover	%	Percent cover of the second type, if any
other2_cover_flag		Flag column to indicate where other cover2 percentage is <1 or other text note
other2_distribution	text	Spatial distribution of the second type, if any
tussock_center_uncompacted_length	cm	Uncompacted length of the central tussock located at the southeast (SE) corner of the 10 m x 10 m plot
tussock_center_compacted_length	cm	Compacted length of the central tussock located at the SE corner of the 10 m x 10 m plot
tussock_center_uncompacted_width	cm	Uncompacted width of the central tussock located at the SE corner of the 10 m x 10 m plot
tussock_center_compacted_width	cm	Compacted width of the central tussock located at the SE corner of the 10 m x 10 m plot
tussock_center_uncompacted_area2	cm^2	Uncompacted area of the central tussock located at the SE corner of the 10 m x 10 m plot
tussock_center_compacted_area2	cm^2	Compacted area of the central tussock located at the SE corner of the 10 m x 10 m plot
tussock_center_depth	cm	Depth (or height) of the central tussock located at the SE corner of the 10 m x 10 m plot
tussock_a_distance_from_center	cm	Distance from tussock A to the central tussock within 1 m x 1 m plots
tussock_a_uncompacted_length	cm	Uncompacted length of tussock A within 1 m x 1 m plots
tussock_a_compacted_length	cm	Compacted length of tussock A within 1 m x 1 m plots
tussock_a_uncompacted_width	cm	Uncompacted width of tussock A within 1 m x 1 m plots
tussock_a_compacted_width	cm	Compacted width of tussock A within 1 m x 1 m plots
tussock_a_uncompacted_area2	cm^2	Uncompacted area of tussock A within 1 m x 1 m plots
tussock_a_compacted_area2	cm^2	Compacted area of tussock A within 1 m x 1 m plots
tussock_a_depth	cm	Depth (height) of tussock A within 1 m x 1 m plots
tussock_b_distance_from_center	cm	Distance from tussock B to the central tussock within 1 m x 1 m plots
tussock_b_uncompacted_length	cm	Uncompacted length of tussock B within 1 m x 1 m plots
tussock_b_compacted_length	cm	Compacted length of tussock B within 1 m x 1 m plots
tussock_b_uncompacted_width	cm	Uncompacted width of tussock B within 1 m x 1 m plots
tussock_b_compacted_width	cm	Compacted width of tussock B within 1 m x 1 m plots
tussock_b_uncompacted_area2	cm^2	Uncompacted area of tussock B within 1 m x 1 m plots
tussock_b_compacted_area2	cm^2	Compacted area of tussock B within 1 m x 1 m plots
tussock_b_depth	cm	Depth (height) of tussock B within 1 m x 1 m plots
tussock_c_distance_from_center	cm	Distance from tussock C to the central tussock within 1 m x 1 m plots
tussock_c_uncompacted_length	cm	Uncompacted length of tussock C within 1 m x 1 m plots
tussock_c_compacted_length	cm	Compacted length of tussock C within 1 m x 1 m plots
tussock_c_uncompacted_width	cm	Uncompacted width of tussock C within 1 m x 1 m plots
tussock_c_compacted_width	cm	Compacted width of tussock C within 1 m x 1 m plots

tussock_c_uncompacted_area2	cm^2	Uncompacted area of tussock C within 1 m x 1 m plots
tussock_c_compacted_area2	cm^2	Compacted area of tussock C within 1 m x 1 m plots
tussock_c_depth	cm	Depth (height) of tussock C within 1 m x 1 m plots
percent_cover_shrubs	%	Percent cover of shrubs in the 1 m x 1 m plot at the SE corner of the 10 m x 10 m plot
ave_height_shrub	cm	Averaged height of shrubs in the 1 m x 1 m plot at the SE corner of the 10 m x 10 m plot
stem_count_shrub	text	Stem count of shrubs in the 1 m x 1 m plot at the SE corner of the 10 m x 10 m plot
depth_to_mineral_soil_1	cm	Soil pit: measurement of depth to mineral soil side 1
depth_to_mineral_soil_2	cm	Soil pit: measurement of depth to mineral soil side 2
depth_to_mineral_soil_3	cm	Soil pit: measurement of depth to mineral soil side 3
depth_to_mineral_soil_4	cm	Soil pit: measurement of depth to mineral soil side 4
ave_depth_to_mineral_soil	cm	Soil pit: averaged depth to mineral soil depth
soil_sampled	text	Soil sample has been collected at the plot for lab measurements: yes or no
thaw_depth_1	cm	The first measurement of thaw depth for 1 m x 1 m plots and transect points
thaw_depth_2	cm	The second measurement of thaw depth for 1 m x 1 m plots and transect points
thaw_depth_3	cm	The third measurement of thaw depth for 1 m x 1 m plots and transect points
thaw_depth_4	cm	The fourth measurement of thaw depth for 1 m x 1 m plots and transect points
thaw_depth_5	cm	The fifth measurement of thaw depth for 1 m x 1 m plots and transect points
thaw_depth_6	cm	The sixth measurement of thaw depth for 1 m x 1 m plots and transect points
active_layer_depth_avg	cm	Averaged active layer thickness for 1 m x 1 m plots and transect points
soil_temp_1	degrees C	The first measurement of soil temperature for 1 m x 1 m plots and transect points
soil_temp_2	degrees C	The second measurement of soil temperature for 1 m x 1 m plots and transect points
soil_temp_3	degrees C	The third measurement of soil temperature for 1 m x 1 m plots and transect points
soil_temp_av	degrees C	Averaged soil temperature for 1 m x 1 m plots and transect points
soil_substrate_1	text	Soil substrate of the first soil temperature measurement, values include: BM (Burned moss), DM (Dead moss), FB (Frost Boil), G (Grass), L (Lichen), M (Moss), MS (Mineral soil), OS (Organic soil), S (Shrub), W (Wetland)
soil_substrate_2	text	Soil substrate of the second soil temperature measurement values include: BM (Burned moss), DM (Dead moss), FB (Frost Boil), G (Grass), L (Lichen), M (Moss), MS (Mineral soil), OS (Organic soil), S (Shrub), W (Wetland)
soil_substrate_3	text	Soil substrate of the third soil temperature measurement values include: BM (Burned moss), DM (Dead moss), FB (Frost Boil), G (Grass), L (Lichen), M (Moss), MS (Mineral soil), OS (Organic soil), S (Shrub), W (Wetland)
notes_alt	text	Additional information of active layer thickness measurements for 1 m x 1 m plots and transect points
notes_site	text	Additional information about the 1 m x 1 m plots and transect points
per_vmc_6cm_oldprobe_1	%	The first % VMC measurement at 6 cm depth using old probe
probe_period_6cm_oldprobe_1	text	Probe period of the first % VMC measurement at 6 cm depth using old probe
per_vmc_6cm_oldprobe_2	%	The second % VMC measurement at 6 cm depth using old probe
probe_period_6cm_oldprobe_2	text	Probe period of the second % VMC measurement at 6 cm depth using old probe
per_vmc_6cm_oldprobe_3	%	The third % VMC measurement at 6 cm depth using old probe
probe_period_6cm_oldprobe_3	text	Probe period of the third % VMC measurement at 6 cm depth using old probe
per_vmc_6cm_oldprobe_4	%	The fourth % VMC measurement at 6 cm depth using old probe
probe_period_6cm_oldprobe_4	text	Probe period of the fourth % VMC measurement at 6 cm depth using old probe
per_vmc_6cm_oldprobe_5	%	The fifth % VMC measurement at 6 cm depth using old probe
probe_period_6cm_oldprobe_5	text	Probe period of the fifth % VMC measurement at 6 cm depth using old probe
per_vmc_av_6cm_old	%	Averaged % VMC measurement at 6 cm depth using old probe
probe_period_av_6cm_old	text	Averaged probe period at 6 cm depth using old probe
per_vmc_calibrated_6cm_old	%	Calibrated % VMC measurement at 6 cm depth using old probe
per_vmc_12cm_oldprobe_1	%	The first % VMC measurement at 12 cm depth using old probe
probe_period_12cm_oldprobe_1	text	Probe period of the first % VMC measurement at 12 cm depth using old probe

per_vmc_12cm_oldprobe_2	%	The second % VMC measurement at 12 cm depth using old probe
probe_period_12cm_oldprobe_2	text	Probe period of the second % VMC measurement at 12 cm depth using old probe
per_vmc_12cm_oldprobe_3	%	The third % VMC measurement at 12 cm depth using old probe
probe_period_12cm_oldprobe_3	text	Probe period of the third % VMC measurement at 12 cm depth using old probe
per_vmc_12cm_oldprobe_4	%	The fourth % VMC measurement at 12 cm depth using old probe
probe_period_12cm_oldprobe_4	text	Probe period of the fourth % VMC measurement at 12 cm depth using old probe
per_vmc_12cm_oldprobe_5	%	The fifth % VMC measurement at 6 cm depth using old probe
probe_period_12cm_oldprobe_5	text	Probe period of the fifth % VMC measurement at 6 cm depth using old probe
per_vmc_av_12cm_old	%	Averaged % VMC measurement at 12 cm depth using old probe
probe_period_av_12cm_old	text	Averaged probe period at 12 cm depth using old probe
per_vmc_calibrated_12cm_old	%	Calibrated % VMC measurement at 12 cm depth using old probe
per_vmc_6cm_newprobe_1	%	The first % VMC measurement at 6 cm depth using new probe
probe_period_6cm_newprobe_1	text	Probe period of the first % VMC measurement at 6 cm depth using new probe
per_vmc_6cm_newprobe_2	%	The second % VMC measurement at 6 cm depth using new probe
probe_period_6cm_newprobe_2	text	Probe period of the second % VMC measurement at 6 cm depth using new probe
per_vmc_6cm_newprobe_3	%	The third % VMC measurement at 6 cm depth using new probe
probe_period_6cm_newprobe_3	text	Probe period of the third % VMC measurement at 6 cm depth using new probe
per_vmc_6cm_newprobe_4	%	The fourth % VMC measurement at 6 cm depth using new probe
probe_period_6cm_newprobe_4	text	Probe period of the fourth % VMC measurement at 6 cm depth using new probe
per_vmc_6cm_newprobe_5	%	The fifth % VMC measurement at 6 cm depth using new probe
probe_period_6cm_newprobe_5	text	Probe period of the fifth % VMC measurement at 6 cm depth using new probe
per_vmc_av_6cm_new	%	Averaged % VMC measurement at 6 cm depth using new probe
probe_period_av_6cm_new	text	Averaged probe period at 6 cm depth using new probe
per_vmc_calibrated_6cm_new	%	Calibrated % VMC measurement at 6 cm depth using new probe
per_vmc_12cm_newprobe_1	%	The first % VMC measurement at 12 cm depth using new probe
probe_period_12cm_newprobe_1	text	Probe period of the first % VMC measurement at 12 cm depth using new probe
per_vmc_12cm_newprobe_2	%	The second % VMC measurement at 12 cm depth using new probe
probe_period_12cm_newprobe_2	text	Probe period of the second % VMC measurement at 12 cm depth using new probe
per_vmc_12cm_newprobe_3	%	The third % VMC measurement at 12 cm depth using new probe
probe_period_12cm_newprobe_3	text	Probe period of the third % VMC measurement at 12 cm depth using new probe
per_vmc_12cm_newprobe_4	%	The fourth % VMC measurement at 12 cm depth using new probe
probe_period_12cm_newprobe_4	text	Probe period of the fourth % VMC measurement at 12 cm depth using new probe
per_vmc_12cm_newprobe_5	%	The fifth % VMC measurement at 12 cm depth using new probe
probe_period_12cm_newprobe_5	text	Probe period of the fifth % VMC measurement at 12 cm depth using new probe
per_vmc_av_12cm_new	%	Averaged % VMC measurement at 12 cm depth using new probe
probe_period_av_12cm_new	text	Averaged probe period at 12 cm depth using new probe
per_vmc_calibrated_12cm_new	%	Calibrated % VMC measurement at 12 cm depth using new probe
per_vmc_20cm_newprobe_1	%	The first % VMC measurement at 20 cm depth using new probe
probe_period_20cm_newprobe_1	text	Probe period of the first % VMC measurement at 12 cm depth using new probe
per_vmc_20cm_newprobe_2	%	The second % VMC measurement at 12 cm depth using new probe
probe_period_20cm_newprobe_2	text	Probe period of the second % VMC measurement at 12 cm depth using new probe
per_vmc_20cm_newprobe_3	%	The third % VMC measurement at 12 cm depth using new probe
probe_period_20cm_newprobe_3	text	Probe period of the third % VMC measurement at 12 cm depth using new probe
per_vmc_20cm_newprobe_4	%	The fourth % VMC measurement at 12 cm depth using new probe
probe_period_20cm_newprobe_4	text	Probe period of the fourth % VMC measurement at 12 cm depth using new probe
per_vmc_20cm_newprobe_5	%	The fifth % VMC measurement at 12 cm depth using new probe
probe_period_20cm_newprobe_5	text	Probe period of the fifth % VMC measurement at 12 cm depth using new probe
per_vmc_av_20cm_new	%	Averaged % VMC measurement at 20 cm depth using new probe
probe_period_av_20cm_new	text	Averaged probe period at 20 cm depth using new probe
per_vmc_calibrated_20cm_new	%	Calibrated % VMC measurement at 20 cm depth using new probe

notes_soilmoisture	text	Additional information of soil moisture measurements
photo_north	text	ID of the photo taken towards the north of the 10 m x 10 m plot
photo_south	text	ID of the photo taken towards the south of the 10 m x 10 m plot
photo_east	text	ID of the photo taken towards the east of the 10 m x 10 m plot
photo_west	text	ID of the photo taken towards the west of the 10 m x 10 m plot
photo_nadir	text	ID of the photo taken at nadir of the 10 m x 10 m plot
photo_other	text	IDs of other photos related to the 10 m x 10 m plot
photo_other_desc	text	Description of "Photo_Other"

3. Application and Derivation

The Alaskan tundra experiences a large number of small fires with shorter return intervals. This study examined the impact of single and repeated fires on vegetation and soil properties compared to unburned areas. The data can be used in studies focused on soil ecosystem functioning, permafrost, and climate change.

4. Quality Assessment

Dual blind entries for data were implemented to identify and correct errors from the process of transcribing field datasheets.

5. Data Acquisition, Materials, and Methods

Study Sites

The data were collected during three field campaigns at sites with active fire activity located in the Noatak River Valley, Seward Peninsula, and North Slope regions in Alaska. The field campaigns were conducted from July to August in the years 2016, 2017, and 2018.

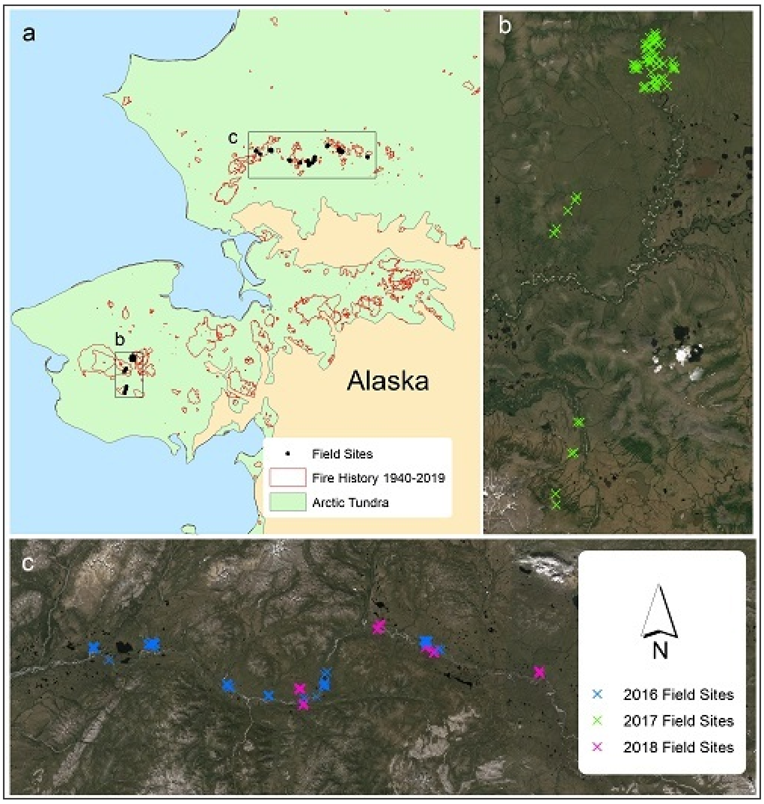

Figure 2. Location of field sites in Alaska, U.S.

Fire Variables

The potential field sites were determined *a priori* using a suite of fire indices and topographic variables. Burned and unburned areas were identified within fire perimeters recorded in the Alaska Large Fire Database (ALFD; available at https://blm-egis.maps.arcgis.com/apps/MapSeries/index.html?appid=32ec4f34fb234ce58df6b1222a207ef1). Plots were established at random points at locations of 24 individual fires spanning the 1971–2015 fire seasons and covered combinations of fire properties and drainage categories.

Landsat satellite imagery data (available at https://earthexplorer.usgs.gov/) were used to calculate the indices of fire severity. Using one clear image taken during the next growing season after an identified fire, two fire indices were used to identify burned areas and classify burn severity. For fires pre-1982, Tasseled-Cap Greenness (Kauth and Thomas, 1976) was used to identify burned and unburned areas. For fires post-1982, the Normalized Burn Ratio following methods described in Loboda et al. (2013) was used.

The Burn Severity Index was assigned using the tundra-specific methodology (Loboda et al., 2013). Fire frequency and years since the last burn was calculated for both burned and unburned areas using the ALFD and Landsat imagery (He et al., 2021).

Topographic Variables

Four categories were developed for drainage types as in Kasischke and Hoy (2012); elevation, and slope and flow accumulation (calculated using a digital elevation model (Carswell, 2013).

1. flat, poorly drained (slope<2 degrees & flow accumulation>0)
2. flat, drained (slope<2 degrees & flow accumulation=0)

3. moderately drained (slope≥2 degrees & flow accumulation>0)
4. well-drained (slope≥2 degrees & flow accumulation=0)

Sampling

The final set of sites was selected using a stratified random sampling scheme, with purposeful oversampling due to anticipated limiting factors the field team may experience once on the ground such as time and physical accessibility. A total of 197 sites were visited (159 burned, 33 unburned) and sampled by establishing a 10 m x 10 m plot. Each plot included a smaller 1 m x 1 m plot in the southeast corner of the site or within 2 m diameter of the transect points. Tussock measurements include the closest tussocks to the SE corner. Soil temperature, soil volumetric moisture content, air temperature, and relative humidity were measured at these 1 m^2 small plots while vegetation characteristics were measured across the 100 m^2 plot. In addition, 632 point locations were sampled along transects in the vicinity of the plots (Fig. 3) where soil temperature, air temperature, and active layer thickness were measured.

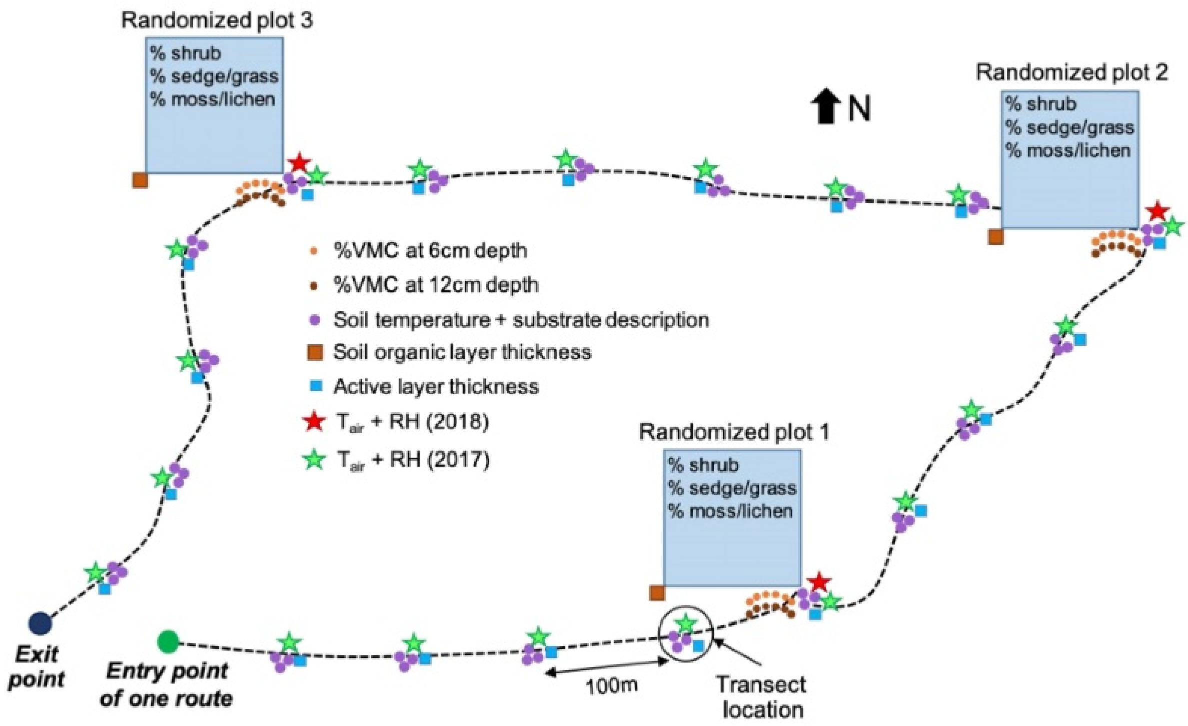

Figure 3. Representative layout of 10 m x 10 m field plots and points sampled along a transect in the same vicinity.

Field measurements included active layer depth, soil temperature, and weather. Different measurements were conducted in plots versus transect points. Soil temperature measurements were recorded using a Hanna digital soil thermometer. Soil moisture was measured using a Campbell Scientific Hydrosense II probe. Soil moisture estimates (%VMC) were calibrated using the equation:

$$\% \text{ VWC} = A*(\text{Probe Period})^2 + B*(\text{Probe Period}) + C$$

Calibration equations were developed (in a laboratory setting) using a total of 22 samples taken during the field campaigns (Jenkins, 2019). Weather data were recorded using Ambient Weather WM-4 digital stations.

Refer to He et al. (2021) for additional information.

6. Data Access

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

Burned and Unburned Field Site Data, Noatak, Seward, and North Slope, AK, 2016-2018

Contact for Data Center Access Information:

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

7. References

Carswell Jr., W.J. 2013. The 3D Elevation Program: summary for Alaska, Fact Sheet. Reston, VA. https://doi.org/10.3133/fs20133083

He, J., D. Chen, L. Jenkins, and T.V. Loboda. 2021. Impacts of wildfire and landscape factors on organic soil properties in Arctic tussock tundra. Environmental Research Letters 16:085004. https://doi.org/10.1088/1748-9326/ac1192

Jenkins, L. 2019. Multi-Scale Detection and Characterization of Physical and Ecological Change in the Arctic Using Satellite Remote Sensing, Chapter 4: Determination of Synthetic Aperture Radar Backscatter in the Tundra as a Function of Fire and Biophysical Parameters. Doctoral Dissertation. University of Michigan. http://hdl.handle.net/2027.42/151574

Kasischke, E.S., and E.E. Hoy. 2012. Controls on carbon consumption during Alaskan wildland fires. Global Change Biology 18:685-699. https://doi.org/10.1111/j.1365-2486.2011.02573.x

Kauth, R. J., and G.S. Thomas. 1976. The tasselled cap--a graphic description of the spectral-temporal development of agricultural crops as seen by Landsat. LARS Symposia Paper 159. https://docs.lib.purdue.edu/lars_symp/159

Loboda, T.V., N.H. French, C. Hight-Harf, L. Jenkins, and M.E. Miller. 2013. Mapping fire extent and burn severity in Alaskan tussock tundra: An analysis of the spectral response of tundra vegetation to wildland fire. Remote Sensing of Environment 134:194-209. https://doi.org/10.1016/j.rse.2013.03.003