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## Pre-ABOVE: Arctic Vegetation Plots at Barrow, Alaska, 2012

### Get Data

Documentation Revision Date: 2017-06-29

Data Set Version: 1

### Summary

This data set provides vegetation cover and environmental plot data collected on the Barrow Environmental Observatory (BEO), Barrow, Alaska in 2012. Forty-eight 1 x 1 m plots were established in homogenous plant communities along two perpendicular transects across ice wedge polygon geomorphic features on the BEO. Plots were distinguished as to their location within the polygons as center, edge, or trough. Vegetation data were originally collected by the U.S. Department of Energy (DOE) Next-Generation Ecosystem Experiment (NGEE) Arctic Project as part of a larger study to understand the response of Arctic terrestrial ecosystems to climate change.

The study plots occur in four plant communities that occur in three habitat types including: 1) Coastal moist tundra - *Carex stans*, *Saxifraga cernua* communities (16 plots), 2) Dry coastal rush tundra (*Luzula confusa*) (4 plots), and 3) Wet non-acidic tundra *Carex* spp., *Eriophorum* spp.-*Amblystegiaceae* communities (28 plots).

The 1 x 1 m plots are designated with the corners permanently marked with white, 1-inch, PVC tubing. The canopy was assumed to have two layers i.e., the sum of vascular plant species coverage was 100 percent and the sum of moss/lichen coverage and bare ground were 100 percent.

There are two data files in comma-separated format (.csv) with this data set and one companion file with a series of plot photos.



Figure 1: NGEE Arctic Study Area A - Polygon 1, a low-centered polygon, showing demarcated vegetation plots: A1E (edge) at left; A1T (trough) at rear; and A1C (center) at right. Located on the Barrow Environmental Observatory, Barrow, Alaska

## Citation

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## 1. Data Set Overview

This data set provides vegetation cover and environmental plot data collected on the Barrow Environmental Observatory (BEO), Barrow, Alaska in 2012. Forty-eight 1 x 1 m plots were established in homogenous plant communities along two perpendicular transects across ice wedge polygon geomorphic features on the BEO. Plots were distinguished as to their location within the polygons – center, edge, or trough.

The plots occur in four plant communities that occur in 3 habitat types including: 1) Coastal moist tundra - *Carex stans*, *Saxifraga cernua* communities (16 plots), 2) Dry coastal rush tundra (*Luzula confusa*) (4 plots), and 3) Wet non-acidic tundra *Carex* spp., *Eriophorum* spp.-*Amblystegiaceae* communities (28 plots).

The 1 x 1 m plots are designated with the corners permanently marked with white-1-inch PVC tubing. The canopy was assumed to have two layers i.e., the sum of vascular plant species coverage was 100 percent and the sum of moss/lichen coverage and bare ground were 100 percent.

**Acknowledgement:** Vegetation data were originally collected (Sloan et al., 2014a) by the U.S. Department of Energy (DOE) Next-Generation Ecosystem Experiment (NGEE) Arctic Program as part of a larger study to understand the structure and function of Arctic terrestrial ecosystems response to climate change.

These data were obtained from the Alaska Arctic Geoecological Atlas (<http://agc.portal.gina.alaska.edu>), which provides access to existing Arctic vegetation plot and map data in support of the ABoVE campaign.

## 2. Data Characteristics

**Spatial Coverage:** Data were collected near Barrow, Alaska, USA.

**ABoVE Site Designation:**

Domain: Core ABoVE region

State/territory: Alaska (study sites around Barrow)

Grid cells: Ahh1Avv0Bh2Bv1

**Spatial Resolution:** Point resolution. Each plot had a minimum area of 1 square meter.

**Temporal Coverage:** 2012-07-17 to 2012-07-21

**Temporal Resolution:** Each plot was sampled once.

**Study Area** (All latitude and longitude given in decimal degrees)

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
Barrow Environmental Observatory (BEO), Barrow, Alaska	-156.61166	-156.59957	71.28216	71.27914

### Data File Information:

There are two data files with this data set in comma-separated (.csv) format. These data may also be found in the TURBOVEG database.

Missing data are represented as -9999.

**Barrow DOE NGEE-Arctic Species Cover:** *Barrow\_NGEE\_Arctic\_Species\_Data.csv*

This file contains species cover data for the vegetation plots. Both the author's determination and the current taxonomy according to the Panarctic Species List (PASL) are listed. Taxa are listed in alphabetical order according to the accepted PASL name. The plot numbers in the source data are the author's. Author plot numbers follow the pattern letter/number/letter and represent: letter (areas A-D in Intensive Study Site 1), number (plot number), and letter (where in the polygon the plot is located, C-center, E-edge, or T-trough).

Column Numbers	Column Name	Units	Description
1	PASL_TAXON_SCIENTIFIC_NAME_NO_AUTHORS		Current Taxonomy according to the Panarctic Species List (PASL) without authors names
2	PASL_TAXON_SCIENTIFIC_NAME_WITH_AUTHOR(S)		Current Taxonomy according to the Panarctic Species List (PASL)
3	DATASET_TAXON		Data set taxonomy
4 to 84	A1C to D4T		Column headings are all 48 plot numbers. Species cover data are given as percentage.

**Barrow DOE NGEE-Arctic Environmental Data:** *Barrow\_NGEE\_Arctic\_Environmental\_Data.csv*

This file contains environmental data and vegetation-type coverage for the vegetation plots. The plot numbers in the source data are the author's. Author plot numbers follow the pattern letter/number/letter and represent: letter (areas A-D in Intensive Study Site 1), number (plot number), and letter (where in the polygon the plot is located, C-center, E-edge, or T-trough).

Column Name	Units / Format	Description
FIELD_PLOT_NUMBER		The plot numbers in the modified source data are the author's. The main plot numbers in the Turboveg database are accession numbers and will differ. The author's plot numbers are retained in the 'Field releve number' field in the Turboveg database
DATE	YYYY-MM-DD	Survey date
RELEVE_AREA	SQUARE METERS	Arctic or Boreal
SHAPE		Shape of sample area
SPECIES_COVERSCALE		land cover units
FIELD_COMMUNITY_NAME		
AUTHOR		
LOCATION		Description of study plot location
GEOREFERENCE_SOURCE		
ACCURACY	M	
LATITUDE	DECIMAL DEGREES	Latitude of the study plot in decimal degrees. All coordinates were projected to the WGS84 datum
LONGITUDE	DECIMAL DEGREES	Longitude of the study plot in decimal degrees. All coordinates were projected to the WGS84 datum
ELEVATION	M	Elevation of plot area in meters
SLOPE	DEGREES	Slope of plot area in degrees
ASPECT	DEGREES	Aspect of plot area in degrees
HABITAT_TYPE		Description of the habitat at the plot
SITE_MOISTURE_REGIME		
ORGANIC_DEPTH	CM	Depth of organic layer
SOIL_PH		pH of soil
COVER_OF_TREES	PERCENT	Percent of plot cover that is trees
COVER_OF_SHRUBS	PERCENT	Percent of plot cover that is shrubs
COVER_OF_TALL_SHRUB	PERCENT	Percent of plot cover that is tall shrubs
COVER_OF_LOW_SHRUB	PERCENT	Percent of plot cover that is low shrubs
COVER_OF_DWARF_SHRUB	PERCENT	Percent of plot cover that is dwarf shrubs
COVER_OF_PROSTRATE_DWARF_SHRUB	PERCENT	Percent of plot cover that is prostrate dwarf shrubs
COVER_OF_GRAMINOID	PERCENT	Percent of plot cover that is graminoids
COVER_OF_TUSSOCK_GRAMINOID	PERCENT	Percent of plot cover that is tussock graminoids
COVER_OF_FORB	PERCENT	Percent of plot cover that is forbs
COVER_OF_SEEDLESS_VASCULAR_PLANTS	PERCENT	Percent of plot cover that is seedless vascular plants

COVER_OF_MOSS	PERCENT	Percent of plot cover that is moss
COVER_OF_LICHEN	PERCENT	Percent of plot cover that is lichen
COVER_OF_SOIL_CRUST	PERCENT	Percent of plot cover that is soil crust
COVER_OF_ALGAE	PERCENT	Percent of plot cover that is algae
COVER_OF_SOIL	PERCENT	Percent of plot cover that is bare soil
COVER_OF_ROCK	PERCENT	Percent of plot cover that is bare rock
COVER_OF_WATER	PERCENT	Percent of plot cover that is water
COVER_OF_LITTER	PERCENT	Percent of plot cover that is litter
COVER_VEGETATION	PERCENT	Percent of plot cover that is vegetation
MEAN_VEGETATION_HEIGHT	CM	Mean vegetation height in centimeters
SHRUB_HEIGHT	CM	Shrub height in centimeters
HERB_HEIGHT	CM	Herb height in centimeters
POLYGON_TYPE		Ice-wedge polygon type where plots are located

### Companion File:

**Barrow DOE NGEE-Arctic Plot Photos:** *Barrow\_NGEE\_Arctic\_Veg\_Plot\_2012\_plot\_photolog.pdf*

This file contains photos of the Barrow NGEE permanent vegetation plots taken in 3 different months, June, July, and August of 2012.

## 3. Application and Derivation

Data were collected to characterize the NGEE Arctic study site, to explore links between plant community composition and micro-topography, and to inform scaling of the landscape from plot to model grid cell.

## 4. Quality Assessment

Voucher specimens were collected for identification purposes.

After the first survey day, two random quadrats from the previous surveys were re-visited at the start of the day, re-surveyed, and the results compared with previous records to ensure consistency in cover estimation.

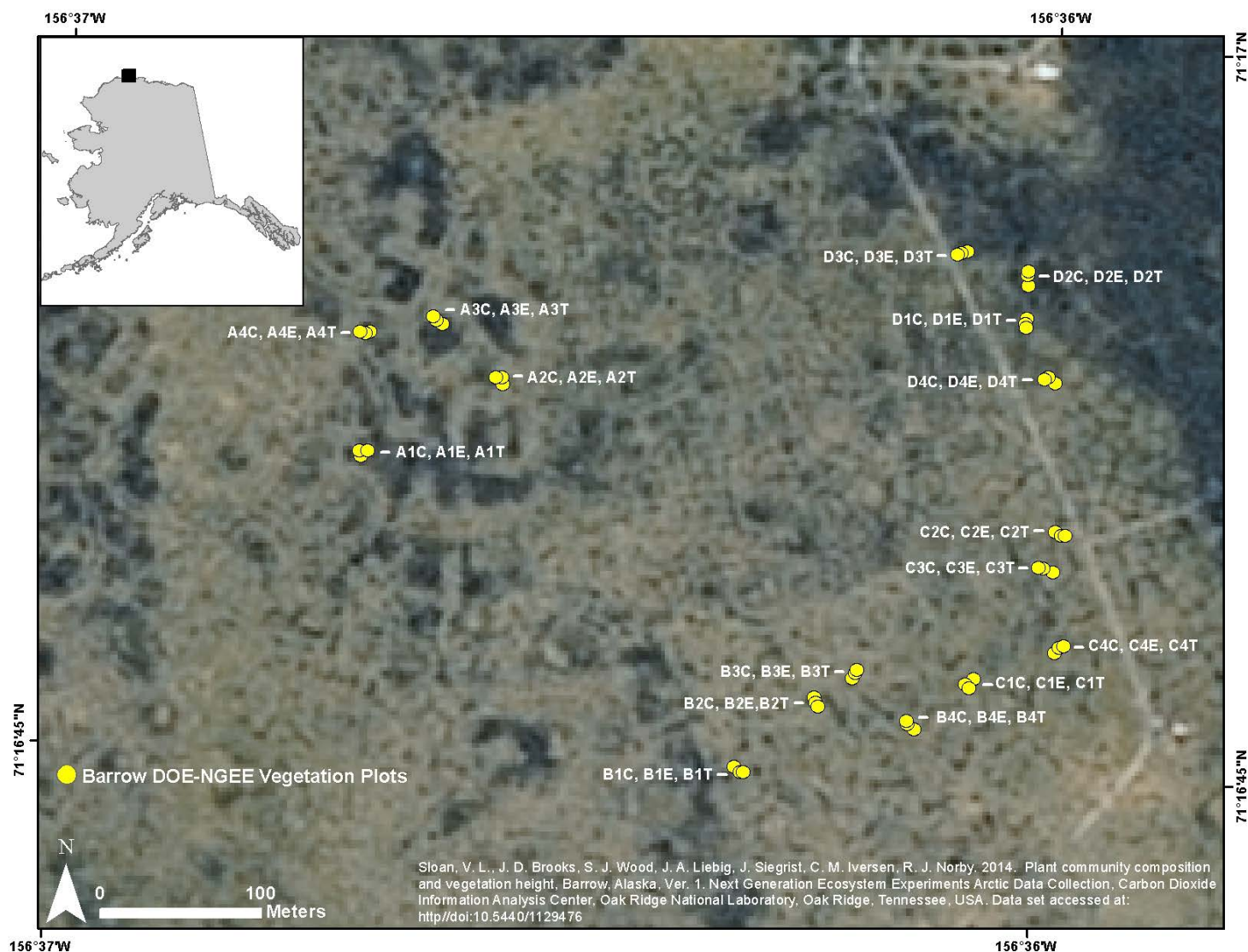
## 5. Data Acquisition, Materials, and Methods

### Site Description

As part of a larger study to understand the structure and function of Arctic terrestrial ecosystems response to climate change, 48 vegetation study plots were established at the Barrow Environmental Observatory, DOE NGEE Intensive Sampling Site 1, areas A-D. Species cover and plot specific environmental data were recorded in 2012. These data were provided by the author (Victoria L. Sloan) and are in part available online along with additional data for the DOE NGEE Intensive Sampling Site 1 areas A-D at the Oak Ridge National Laboratory, Next-Generation Ecosystem Experiment Arctic website (see Sloan et al. 2014a).

Forty-Eight plots were subjectively located in homogenous plant communities located along 2 perpendicular transects. Plots were distinguished as to their location within polygon rims, troughs or edges. The plots occur in four plant communities that occur in 3 habitat types including: 1) Coastal moist tundra - *Carex stans*, *Saxifraga cernua* communities (16 plots), 2) Dry coastal rush tundra (*Luzula confusa*) (4 plots), and 3) Wet non-acidic tundra *Carex* spp., *Eriophorum* spp.-*Amblystegiaceae* communities (28 plots).

Plots are 1 x 1 m with the corners permanently marked with white-1-inch PVC tubing. The canopy was assumed to have two layers i.e., the sum of vascular plant species coverage was 100 percent and the sum of moss/lichen coverage and bare ground were 100 percent.

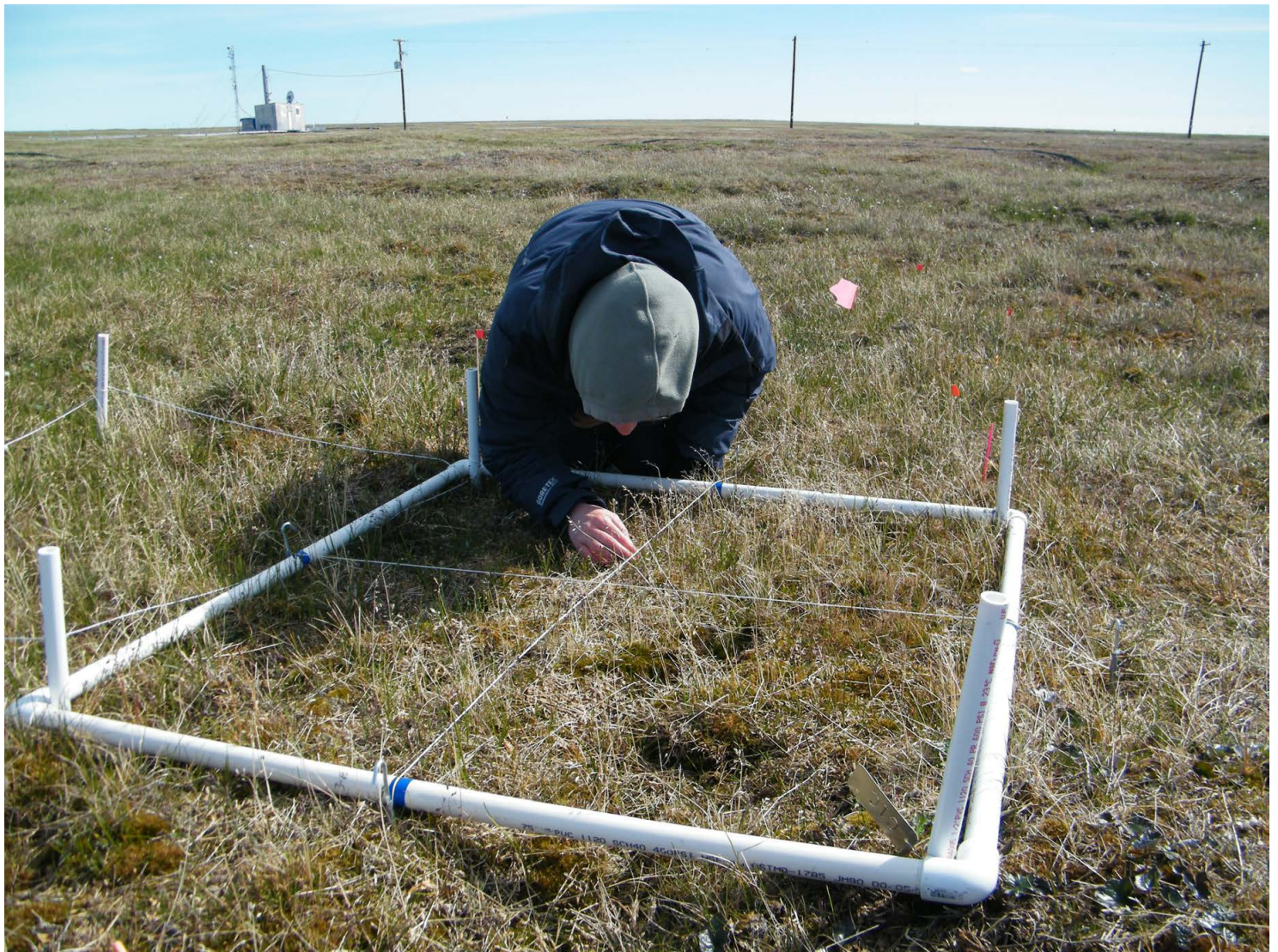


**Figure 2.** Aerial photograph of the of the BEO overlain with Barrow NGEE permanent vegetation plot locations.

## Plant community survey

Forty-eight 1 x 1 m permanent plots were installed in the locations described above in early June 2012. All four corners were marked with PVC poles hammered as far as soil thaw permitted, and plot codes (e.g. A1C) were marked on aluminum tags. A survey of plant community composition in all vegetation plots was undertaken by Victoria Sloan and Jonathan Brooks between 17<sup>th</sup> July and 21<sup>st</sup> July 2012 as follows:

A 1 x 1 m quadrat divided into four 0.5 x 0.5 m sections was placed over the permanent plot, and the aerial percentage cover of all vascular, bryophyte and lichen species in each quarter estimated. Rare species were assigned values of 0.1% (single individual), 1% (multiple scattered individuals) or 3% (more individuals, but still forming < 5% total cover). All remaining species recorded to the nearest 5%. The canopy was assumed to have two layers (i.e. sum of vascular plant species coverage ≤ 100%, sum of moss/lichen coverage and bare ground ≤ 100%). Where the sum of bare ground and moss/lichen coverage < 100%, it can be assumed that vascular plant stems or leaves account for remaining area. Species were grouped as described and data presented are averages of the four measurements. Bare ground mainly consisted of a litter layer. In plots dominated by *Luzula arctica*, standing dead with no green material was placed in this category. After the first survey day, two random quadrats from the previous surveys were re-visited at the start of the day, re-surveyed, and the results compared with previous records to ensure consistency in cover estimation.

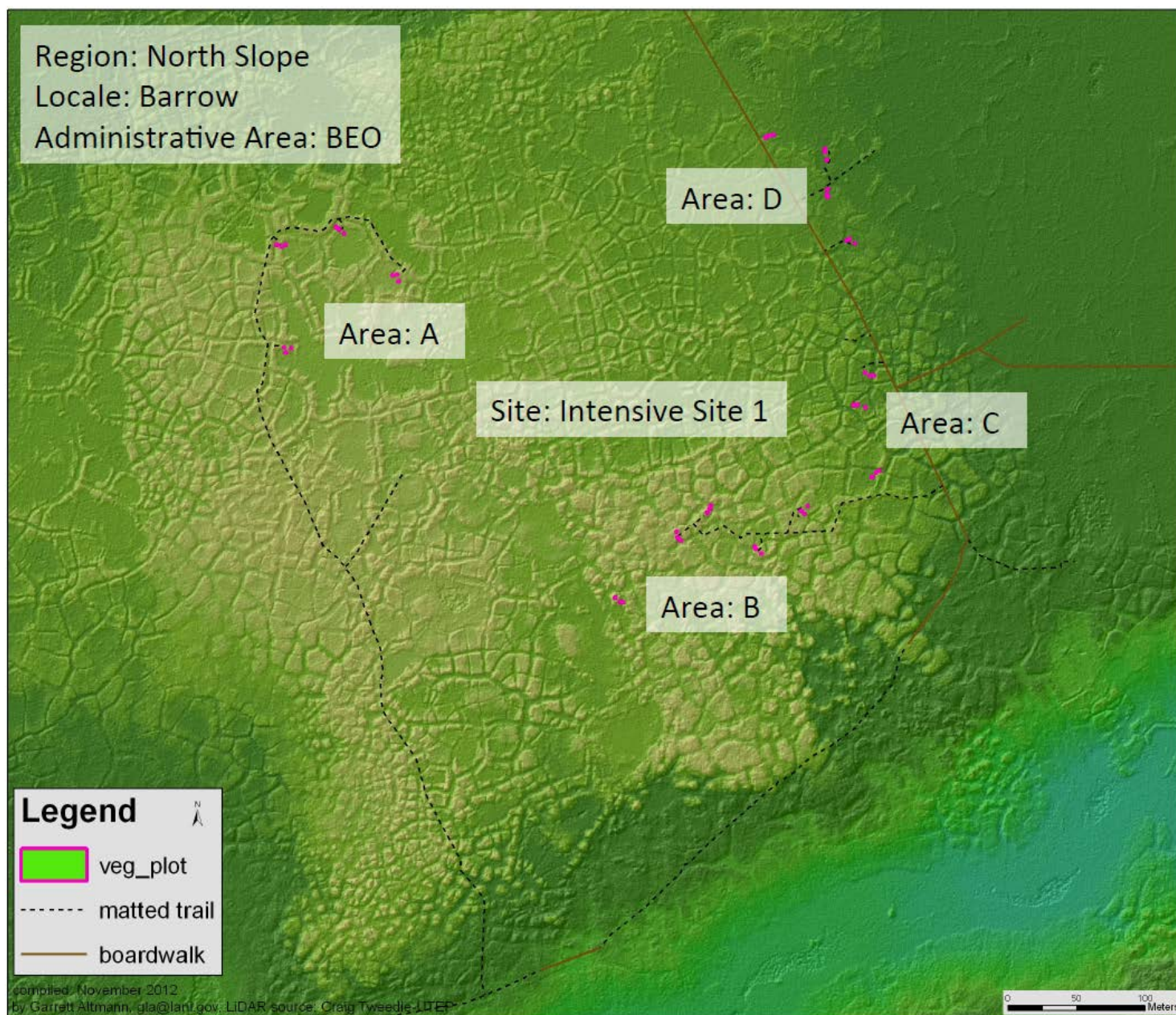


**Figure 3.** Surveying vegetation and determining percent cover by species.

At the time of survey, no standing water was present at the plot surfaces (see Sloan et al., 2014b). Although many trough and low-center plots remained saturated, all moss layers were visible. This was not the case throughout the growing season, and the extent of water coverage in late June and mid-August can be observed on the vegetation plot photographs.

### **Vegetation height**

Vegetation heights were measured by a single surveyor (Jonathan Brooks) during the plant community survey. All species-specific measurements were made on 21<sup>st</sup> July. Measurements were made using a steel ruler, considering zero to be the top of the moss layer and measuring without disturbing the canopy.



**Figure 4.** Vegetation plot locations across study Areas A, B, C, and D.

## 6. Data Access

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

[Pre-ABOVE: Arctic Vegetation Plots at Barrow, Alaska, 2012](#)

Contact for Data Center Access Information:

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

## 7. References

Sloan, V.L., J.D. Brooks, S.J. Wood, J.A. Liebig, J. Siegrist, C.M. Iversen, R.J. Norby. 2014a. Plant community composition and vegetation height, Barrow, Alaska, Ver. 1. Next Generation Ecosystem Experiments Arctic Data Collection, Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA. Data set accessed at <https://dx.doi.org/10.5440/1129476>

Sloan, V. L., J. A. Liebig, M. S. Hahn, J. B. Curtis, J. D. Brooks, A. Rogers, C. M. Iversen, and R. J. Norby. 2014b. Soil temperature, soil moisture and thaw depth, Barrow, Alaska, Ver. 1. Next Generation Ecosystem Experiments Arctic Data Collection (NGEE-Arctic), Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA. Data set accessed at <https://dx.doi.org/10.5440/1121134>





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