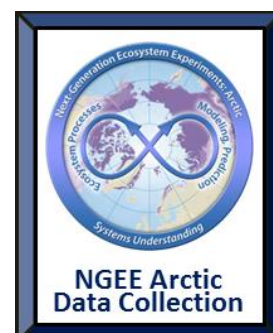


Plant community composition and vegetation height, Barrow, Alaska, Ver. 1

For NGEE Arctic Project use only.



Summary:

This dataset contains i) the results of field surveys of plant community composition and vegetation height made between 17th and 29th July 2012 in 48, 1 x 1 m plots located in areas A-D of Intensive Site 1 at the Next-Generation Ecosystem Experiments (NGEE) Arctic site near Barrow, Alaska and ii) results of a mapping exercise undertaken in August 2013 using two perpendicular transects across each polygon containing vegetation plots to determine the boundaries of vegetation communities described in 2012.

Please use this citation to reference the data.

Sloan, V.L., J.D. Brooks, S.J. Wood, J.A. Liebig, J. Siegrist, C.M. Iversen, R.J. Norby. 2014. 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 <http://dx.doi.org/10.5440/1129476>

Data Characteristics

The dataset comprises the following:

1. Four comma-separated (*.csv) files from the 2012 field survey containing i) plant community composition data, ii) species height data iii) total canopy height data, iv) dGPS co-ordinates of vegetation survey plots.
2. A .pdf file containing further information on plant species and functional type groupings.
3. A .pdf map showing the vegetation survey plot locations
4. Twelve .zip files containing plot photographs from the 2012 growing season.
5. Two comma-separated (*.csv) files from the 2013 field survey containing i) vegetation boundary data and ii) dGPS co-ordinates of transects
6. A *.pdf User Guidance Document describing the entire dataset.

Data Dictionary

Plant community composition 2012:

V_1.2_plant_community_composition_Barrow_2012_v1.csv

Column name	Units/format	Description
region*		Values: North Slope
locale*		Values: Barrow
administrative_area*		Values: Barrow Environmental Observatory (BEO)
site*		Values: Intensive Site 1
area*		Values: A,B,C,D
polygon_ID		Values: 1, 2, 3, 4 Vegetation plots are located on four separate polygons within each larger area.
polygon_sub_unit		Values: center, edge, trough Three vegetation plots are located in each polygon. One plot is located in each of three 'sub-units' or micro-topographic positions.
plot_ID		plot_ID is a unique plot code formed by concatenation of area, polygon_ID, and polygon_sub_unit. For example, plot A1C is in area A, polygon 1, and is specifically located in the Center of the polygon. See section "Vegetation plot layout" (below) for further information.
plot_type*		Values: vegetation
polygon_type		Values: high-centered, low-centered, transitional Type of polygon characteristic of respective area.
measurement_date	yyyy-mm-dd	
measurement_DOY		Day of Year 1 was January 1, 2012 or 2013.
Columns 13 to 64 contain species names, genera or other survey groups or categories	% cover	See Footnote 1 and Data Acquisition Materials and Methods section for further details.

* Values for these location fields have been standardized for NGEA Arctic. ([https://ngea-arctic.ornl.gov/sites/ngea.ornl.gov/files/NGEA Arctic Data Management Guides stylesheet 20131127.pdf](https://ngea-arctic.ornl.gov/sites/ngea.ornl.gov/files/NGEA%20Arctic%20Data%20Management%20Guides%20stylesheet%20131127.pdf))

Footnotes:

1. See associated file **V_1.2_species_list_plant_community_survey_Barrow_2012.pdf** for a list of species grouped by plant functional type and additional notes on other survey categories.

Example Data Records:

[illegible]

Vegetation height 2012:**V_1.2_species_leaf_height_Barrow_2012_v1.csv**

Missing numeric values are given the value -9999.

column_name	units/format	description
Columns 1-12 in this file are the same as the above "V_1.2_plant_community_composition_Barrow_2012_v1.csv" file.		
species		See Footnote 1 (above).
leaf_height	cm	Height of tallest leaf of species within canopy in ten random locations within the 1 x 1 m vegetation survey plots. Where a species was insufficiently abundant for ten measurements, five were made.

Example Data Records:

```

region,locale,administrative_area,site,area,polygon_ID,polygon_sub_unit,plot_ID,plot_type,polygon_type,measurement_date,measurement_DOY,species,leaf_height
,,,,,,,,,yyyy-mm-dd,,,cm
North Slope,Barrow,BEO,Intensive Site 1,A,1,C,A1C,vegetation,low-centered,2012-07-29,210,Carex aquatilis,18.5
North Slope,Barrow,BEO,Intensive Site 1,A,1,C,A1C,vegetation,low-centered,2012-07-29,210,Carex aquatilis,21.2
North Slope,Barrow,BEO,Intensive Site 1,A,1,C,A1C,vegetation,low-centered,2012-07-29,210,Carex aquatilis,28.8
...
North Slope,Barrow,BEO,Intensive Site 1,D,4,T,D4T,vegetation,low-centered,2012-07-29,210,Eriophorum sp.,13.5
North Slope,Barrow,BEO,Intensive Site 1,D,4,T,D4T,vegetation,low-centered,2012-07-29,210,Eriophorum sp.,19.5
North Slope,Barrow,BEO,Intensive Site 1,D,4,T,D4T,vegetation,low-centered,2012-07-29,210,Eriophorum sp.,9

```

V_1.2_vegetation_canopy_height_Barrow_2012_v1.csv

Missing numeric values are given the value -9999.

column_name	units/format	description
Columns 1-12 in this file are the same as the above "V_1.2_plant_community_composition_2012_v1.csv" file.		
canopy_height	cm	Maximum height of vegetation canopy (inflorescences included) in a grid of 3 x 3 points spaced at 0.5 m intervals over the 1 x 1 m vegetation plots.

Example Data Records:

```

region,locale,administrative_area,site,area,polygon_ID,polygon_sub_unit,plot_ID,plot_type,polygon_type,measurement_date,measurement_DOY,canopy_height
,,,,,,,,,yyyy-mm-dd,,cm
North Slope,Barrow,BEO,Intensive Site 1,A,1,center,A1C,vegetation,low-centered,2012-07-18,200,14
North Slope,Barrow,BEO,Intensive Site 1,A,1,center,A1C,vegetation,low-centered,2012-07-18,200,17
North Slope,Barrow,BEO,Intensive Site 1,A,1,center,A1C,vegetation,low-centered,2012-07-18,200,15
...
North Slope,Barrow,BEO,Intensive Site 1,D,4,trough,D4T,vegetation,low-centered,2012-07-20,202,20
North Slope,Barrow,BEO,Intensive Site 1,D,4,trough,D4T,vegetation,low-centered,2012-07-20,202,22
North Slope,Barrow,BEO,Intensive Site 1,D,4,trough,D4T,vegetation,low-centered,2012-07-20,202,27

```

Vegetation plot layout:

V_vegetation_plot_layout_diagram.pdf

This file is a map showing the vegetation plot locations and describing the plot naming scheme (see figures below for same content).

V_vegetation_plot_locations.csv

This file contains differential GPS coordinates of vegetation plot locations.

Column name	Units/format	Description
Columns 1-10 in this file are the same as the above "V_1.2_plant_community_composition_2012_v1.csv" file.		
northing_UTM	meters	<p>Coordinates of four corners of 1 x 1 m vegetation plots, recorded using differential GPS.</p> <p>Survey was carried out by UMIAQ on September 29th, 2012. See Footnote 2.</p> <p>Co-ordinate system is Universal Transverse Mercator (UTM). Details: UTM Zone 4, horizontal datum is NAD83, vertical datum is NAVD88 using GEOID09. UNAVCO CORS Station SG27 was held fixed to generate co-ordinates, and station BASC used as a check.</p>
easting_UTM	meters	<p>Coordinates of four corners of 1 x 1 m vegetation plots, recorded using differential GPS.</p> <p>Survey was carried out by UMIAQ on September 29th, 2012. See Footnote 2.</p> <p>Co-ordinate system is Universal Transverse Mercator (UTM). Details: UTM Zone 4, horizontal datum is NAD83, vertical datum is NAVD88 using GEOID09. UNAVCO CORS Station SG27 was held fixed to generate co-ordinates, and station BASC used as a check.</p>

Footnotes:

2. UMIAQ -

<http://www.uicprofessionalservices.com/services/category/uic-science/arctic-science-logistics-support/>

Example Data Records:

region	locale	administrative_area	Site	area	polygon_ID	polygon_sub_unit	plot_ID	plot_type	polygon_type	northing_UTM	easting_UTM
,,,,,,,,,,											
North Slope	Barrow	BEO	Intensive Site 1	A	1	center	A1C	vegetation	low-centered	7910413.488	585530.849
North Slope	Barrow	BEO	Intensive Site 1	A	1	center	A1C	vegetation	low-centered	7910413.638	585529.925
North Slope	Barrow	BEO	Intensive Site 1	A	1	center	A1C	vegetation	low-centered	7910414.625	585530.097
North Slope	Barrow	BEO	Intensive Site 1	A	1	center	A1C	vegetation	low-centered	7910414.442	585531.05
...											
North Slope	Barrow	BEO	Intensive Site 1	D	4	trough	D4T	vegetation	low-centered	7910493.022	585940.843
North Slope	Barrow	BEO	Intensive Site 1	D	4	trough	D4T	vegetation	low-centered	7910492.724	585941.739
North Slope	Barrow	BEO	Intensive Site 1	D	4	trough	D4T	vegetation	low-centered	7910491.806	585941.447
North Slope	Barrow	BEO	Intensive Site 1	D	4	trough	D4T	vegetation	low-centered	7910492.077	585940.545

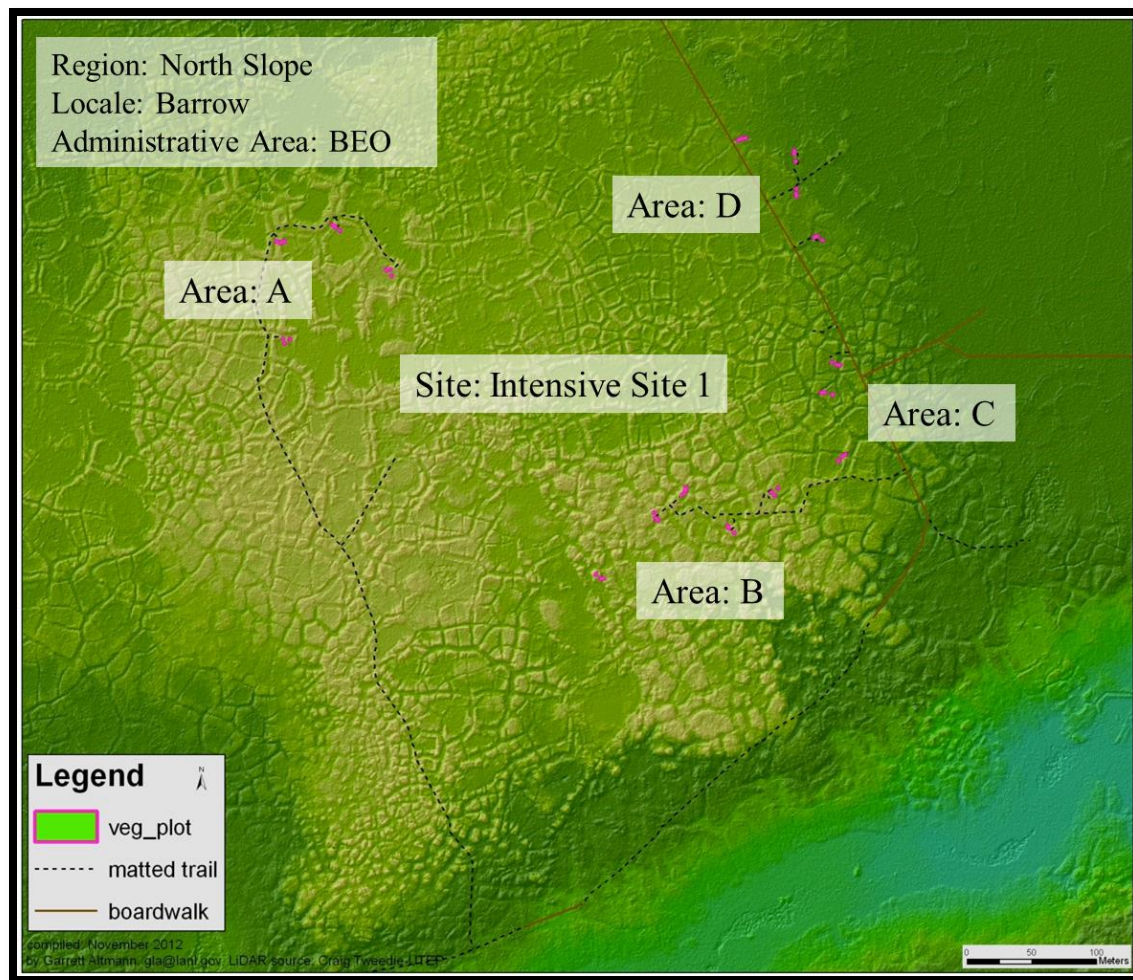


Figure 1: Locations of vegetation plots within areas A-D, Intensive Site 1, Barrow Environmental Observatory (BEO), Barrow, Alaska. LiDAR source: Craig Tweedie, University of Texas, El Paso.

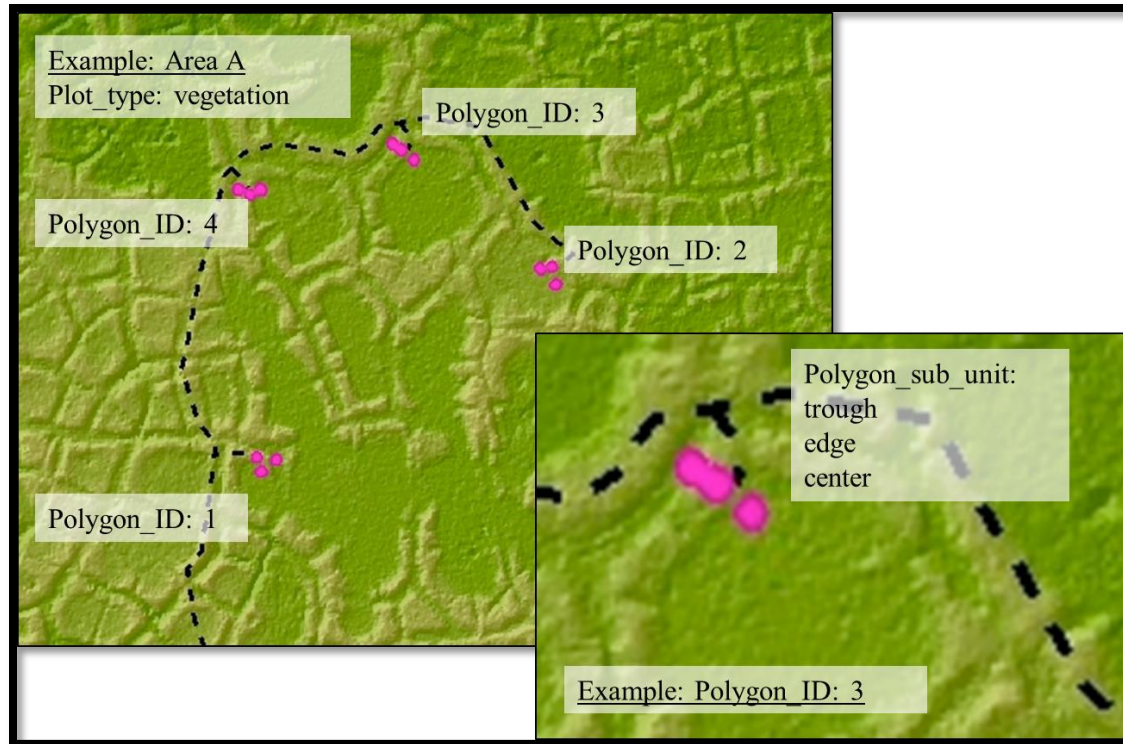


Figure 2: Schematic showing details of vegetation plot naming scheme within each area (example shown: area A). Plots were located in four polygons per area (polygon_ID, 1 – 4), and in each polygon, plots were placed in three micro-topographic positions: center, edge and trough (polygon_sub_unit: see inset). plot_ID is formed by concatenation of area, polygon_ID and polygon_sub_unit.

Vegetation plot photographs:

Each of the following *.zip files contains 12 .jpg images of the 1 x 1 m vegetation survey plots, grouped by area. Photograph filenames contain the vegetation plot code (e.g. A1C) and the date.

V_vegetation_plot_photographs_Barrow_areaA_20120624

V_vegetation_plot_photographs_Barrow_areaA_20120715

V_vegetation_plot_photographs_Barrow_areaA_20120817

V_vegetation_plot_photographs_Barrow_areaB_20120624

V_vegetation_plot_photographs_Barrow_areaB_20120715

V_vegetation_plot_photographs_Barrow_areaB_20120817

V_vegetation_plot_photographs_Barrow_areaC_20120624

V_vegetation_plot_photographs_Barrow_areaC_20120715

V_vegetation_plot_photographs_Barrow_areaC_20120817

V_vegetation_plot_photographs_Barrow_areaD_20120624

V_vegetation_plot_photographs_Barrow_areaD_20120715

V_vegetation_plot_photographs_Barrow_areaD_20120817

Vegetation transects 2013:**V_vegetation_transects_Barrow_2013.csv**

column_name	units/format	description
Columns 1-6 in this file are the same as the above "V_1.2_plant_community_composition_2012_v1.csv" file		
transect		<p>Values: J, V</p> <p>Designations to differentiate two transects per polygon.</p> <p>See Figure 3 and Data Acquisition Materials and Methods section (below) for further details.</p>
measurement_date	yyyy-mm-dd	
measurement_DOY		Day of Year 1 was January 1, 2012 or 2013.
distance_from_start	m	<p>Distance from start of transect, measured using 50 m tape stretched between start and end point of transect.</p> <p>Distance denotes the end point of the specified vegetation type. For example, distance_from_start = 0.8 m indicates that the described vegetation type is present from 0 to 0.8 m along the transect.</p>
vegetation_type		<p>Values: center, edge, trough</p> <p>In this context, 'center', 'edge' and 'trough' refer to the vegetation community present in the vegetation plot at the corresponding location and micro-topographic position. For example, a designation of 'trough' along a transect crossing polygon A1 refers to vegetation similar to that found in plot A1T.</p> <p>See Figure 3 and Data Acquisition Materials and Methods section (below) for further details.</p>
notes		Additional comments regarding the vegetation present in this location. "None" denotes no additional information.

Example Data Records:

```

region,locale,administrative_area,site,area,polygon_ID,transect,measurement_date,measurement
_DOY,distance_from_start,vegetation_type,notes
,,,,,,,,m,,
North Slope,Barrow,BEO,Intensive Site 1,A,1,V,2013-08-21,233,0.8,edge,wet
North Slope,Barrow,BEO,Intensive Site 1,A,1,V,2013-08-21,233,3.4,trough,none
North Slope,Barrow,BEO,Intensive Site 1,A,1,V,2013-08-21,233,4.2,edge,Sphagnum abundant
North Slope,Barrow,BEO,Intensive Site 1,A,1,V,2013-08-21,233,8.1,edge,none
North Slope,Barrow,BEO,Intensive Site 1,A,1,V,2013-08-21,233,16.5,center,none
North Slope,Barrow,BEO,Intensive Site 1,A,1,V,2013-08-21,233,17.6,edge,wet
North Slope,Barrow,BEO,Intensive Site 1,A,1,V,2013-08-21,233,20.9,trough,none
North Slope,Barrow,BEO,Intensive Site 1,A,1,V,2013-08-21,233,21.95,edge,none
...
North Slope,Barrow,BEO,Intensive Site 1,D,4,J,2013-08-21,233,1.2,edge,none
North Slope,Barrow,BEO,Intensive Site 1,D,4,J,2013-08-21,233,3.6,trough,none
North Slope,Barrow,BEO,Intensive Site 1,D,4,J,2013-08-21,233,8.1,edge,none
North Slope,Barrow,BEO,Intensive Site 1,D,4,J,2013-08-21,233,15.9,center,none
North Slope,Barrow,BEO,Intensive Site 1,D,4,J,2013-08-21,233,17.6,edge,none
North Slope,Barrow,BEO,Intensive Site 1,D,4,J,2013-08-21,233,19.7,trough,none
North Slope,Barrow,BEO,Intensive Site 1,D,4,J,2013-08-21,233,22.05,edge,none

```

V_vegetation_survey_transect_co-ordinates_Barrow_2013_v1.csv

This file contains differential GPS coordinates of vegetation survey transects.

column_name	units/format	description
Columns 1-6 in this file are the same as the above "V_1.2_plant_community_composition_2012_v1.csv" file.		
transect		<p>Values: J, V</p> <p>Designations to differentiate two transects per polygon.</p> <p>See Figure 3 and Data Acquisition Materials and Methods section (below) for further details.</p>
transect_position		<p>Values: start, end</p> <p>Identifies direction of vegetation boundary recording.</p> <p>See Figure 3 (below) for further details.</p>
transect_ID		<p>Unique code for each point.</p> <p>"A1_J_start" refers to area A, polygon 1, transect J, starting point.</p>
dGPS_survey_ID		<p>Unique code for each point.</p> <p>"A1_J_start" refers to area A, polygon 1, transect J, starting point.</p> <p>See Figure 3 (below) for further details.</p>
measurement_date	yyyy-mm-dd	
measurement_DOY		Day of Year 1 was January 1, 2012 or 2013.
northing_UTM		<p>dGPS survey was carried out by University of Texas El Paso, Systems Ecology Laboratory.</p> <p>http://baid.utep.edu/dgps-support</p> <p>Further details of survey methodology available on request from UTEP.</p>
easting_UTM		<p>dGPS survey was carried out by University of Texas El Paso, Systems Ecology Laboratory.</p> <p>http://baid.utep.edu/dgps-support</p> <p>Further details of survey methodology available on request from UTEP.</p>

Example Data Records:

```
region,locale,administrative_area,site,area,polygon,transect,measurement_date,measurement_D  
OY,transect_position,transect_ID,dGPS_survey_ID,northing_UTM,easting_UTM  
,,,,,,,,,  
North Slope,Barrow,BEO,Intensive Site 1,A,1,J,2013-08-20,232,start,A1_J_start,ngvt-  
025,7910419.432,585534.616  
North Slope,Barrow,BEO,Intensive Site 1,A,1,J,2013-08-20,232,end,A1_J_end,ngvt-  
027,7910392.921,585527.841  
North Slope,Barrow,BEO,Intensive Site 1,A,1,V,2013-08-20,232,start,A1_V_start,ngvt-  
028,7910407.948,585518.24  
North Slope,Barrow,BEO,Intensive Site 1,A,1,V  
....  
North Slope,Barrow,BEO,Intensive Site 1,D,4,J,2013-08-19,231,start,D4_J_start,vt-  
016,7910481.909,585941.969  
North Slope,Barrow,BEO,Intensive Site 1,D,4,J,2013-08-19,231,end,D4_J_end,vt-  
014,7910502.341,585950.106  
North Slope,Barrow,BEO,Intensive Site 1,D,4,V,2013-08-19,231,start,D4_V_start,vt-  
015,7910481.565,585953.335  
North Slope,Barrow,BEO,Intensive Site 1,D,4,V,2013-08-19,231,end,D4_V_end,vt-  
013,7910498.365,585938.275
```

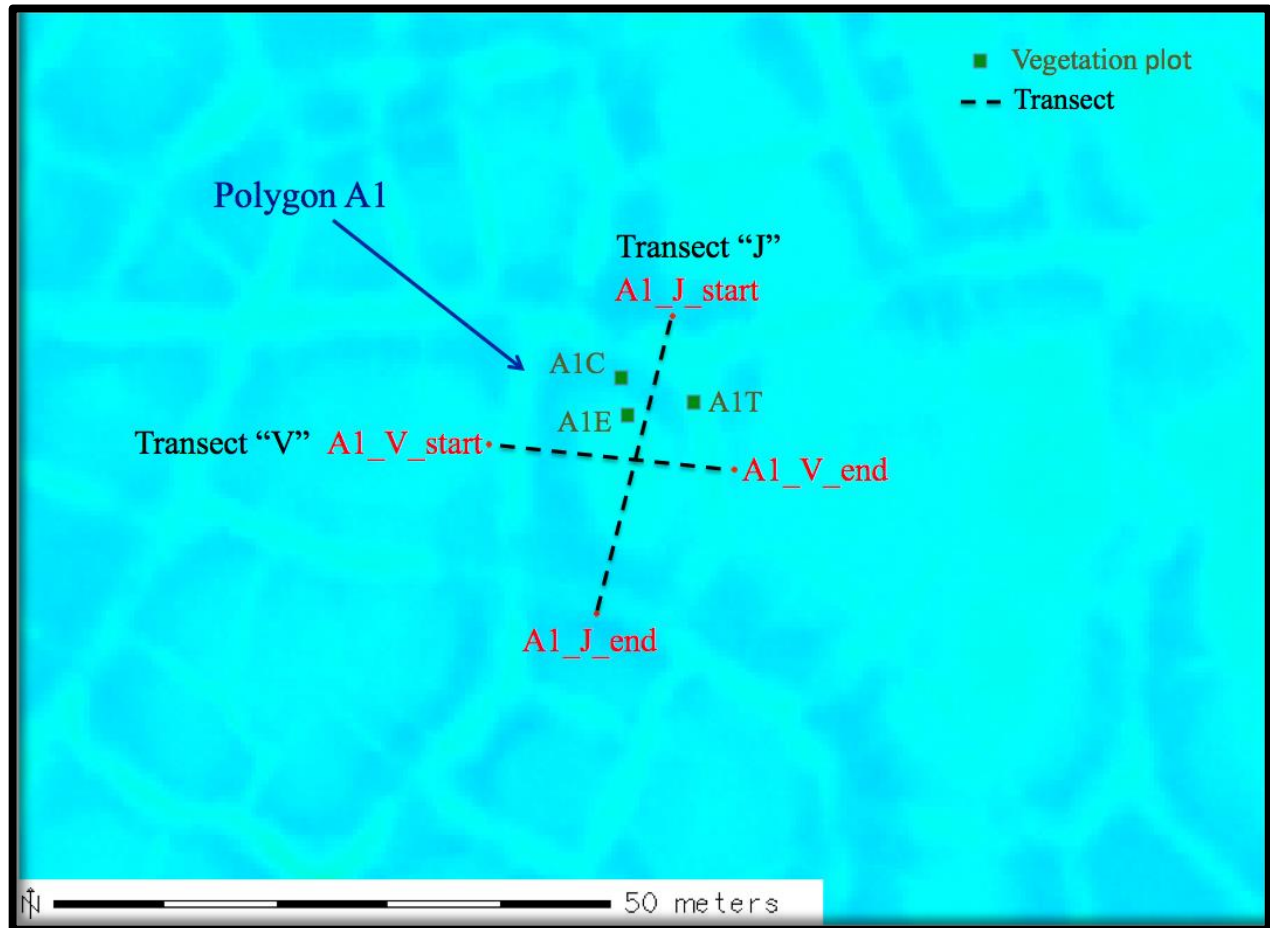


Figure 3: Schematic showing details of vegetation transect naming scheme (example, polygon A1). Two approximately perpendicular transects (J, V) were located on all polygons containing vegetation plots. Start was defined based on access from matted trail.

Data Acquisition Materials and Methods

Plant community survey

48, 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 17th July and 29th 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 $\leq 100\%$, sum of moss/lichen coverage and bare ground $\leq 100\%$). 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 in the accompanying file **V_1.2_species_list_plant_community_survey_Barrow_2012.pdf**, 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.

At the time of survey, no standing water was present at the plot surfaces (Sloan et al., 2014). 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 29th July. Measurements were made using a steel ruler, considering zero to be the top of the moss layer and measuring without disturbing the canopy.

Vegetation transects

Temporary transects were installed on all polygons containing vegetation plots on 19th August 2013, with both ends marked by a flag. Transects were approximately perpendicular (orientation determined by access from matted trails), and spanned the center, rim and trough at either side of the polygon.

Flag locations were surveyed on 19th and 20th August using dGPS (University of Texas El Paso, Systems Ecology Laboratory, <http://baid.utep.edu/dgps-support>).

On 21st August, all vegetation transects were surveyed by stretching a 50 m tape between flags. One end was secured using a metal pole, the other held securely in place by a surveyor. The distance to the boundaries of the ‘center’, ‘edge’ and ‘trough’ vegetation communities (defined based on the species composition of the vegetation plots located within the survey polygon in those locations) from the start of the tape were recorded.

Plot photographs

Photographs were taken on 24th June, 15th July and 17th August 2012, using a Canon Ixus 70 7.1 megapixel digital camera. Photographs were taken during the recording of weekly soil moisture, temperature and thaw depth measurements (Sloan et al., 2014), over a time period spanning approximately 6 hours on each day. Photographs were taken from positions where matted trail allowed access to vegetation plots. These photographs were intended only to give a general impression of site conditions and vegetation appearance, and orientation may not be consistent between dates.

References:

Sloan, V.L., J.A. Liebig, M.S. Hahn, J.B. Curtis, J.D. Brooks, A. Rogers, C.M. Iversen, R.J. Norby. 2014. Soil temperature, soil moisture and thaw depth, 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 <http://dx.doi.org/10.5440.1121134>