Arctic Vegetation Sampling

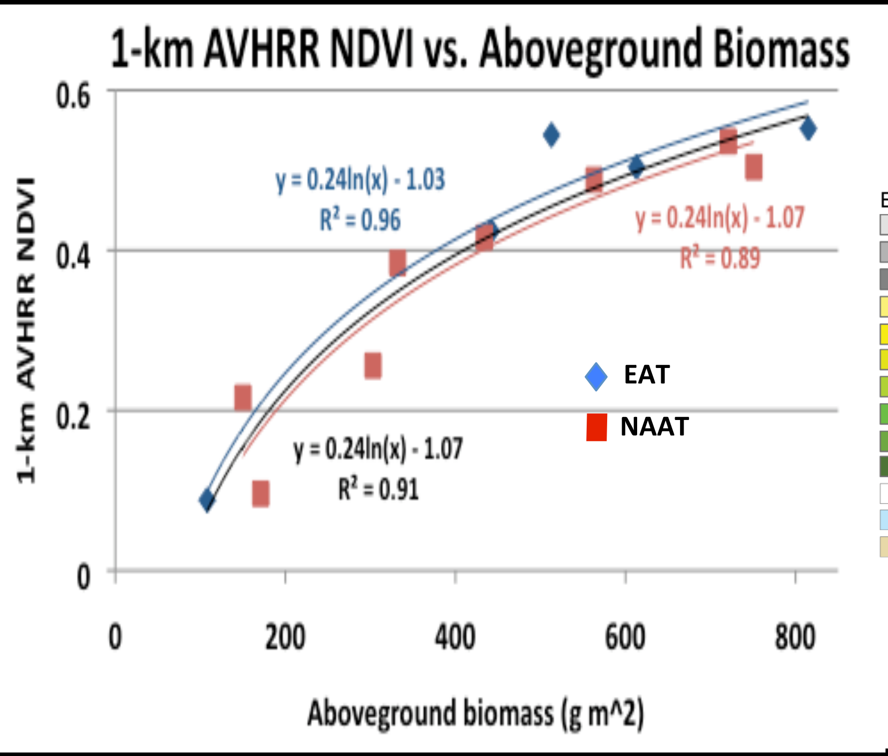
Skip Walker

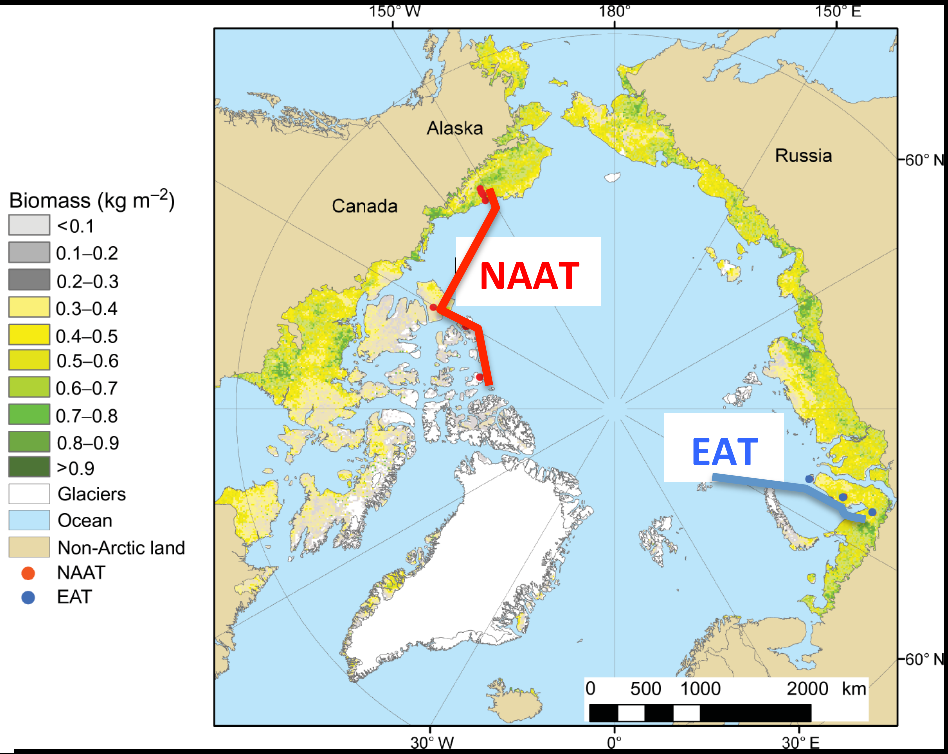
Vegetation sampling, Biomass, NDVI, LAI, Zonal concept, Arctic Vegetation Archive

Biomass Workshop, Fairbanks, 2-4 Sep 2014

Photo: Ina Timling

Zonal phytomass is strongly correlated to NDVI across two Arctic transects.





How is such a tight correlation across two transects possible given the known high spatial variability in Arctic vegetation biomass?

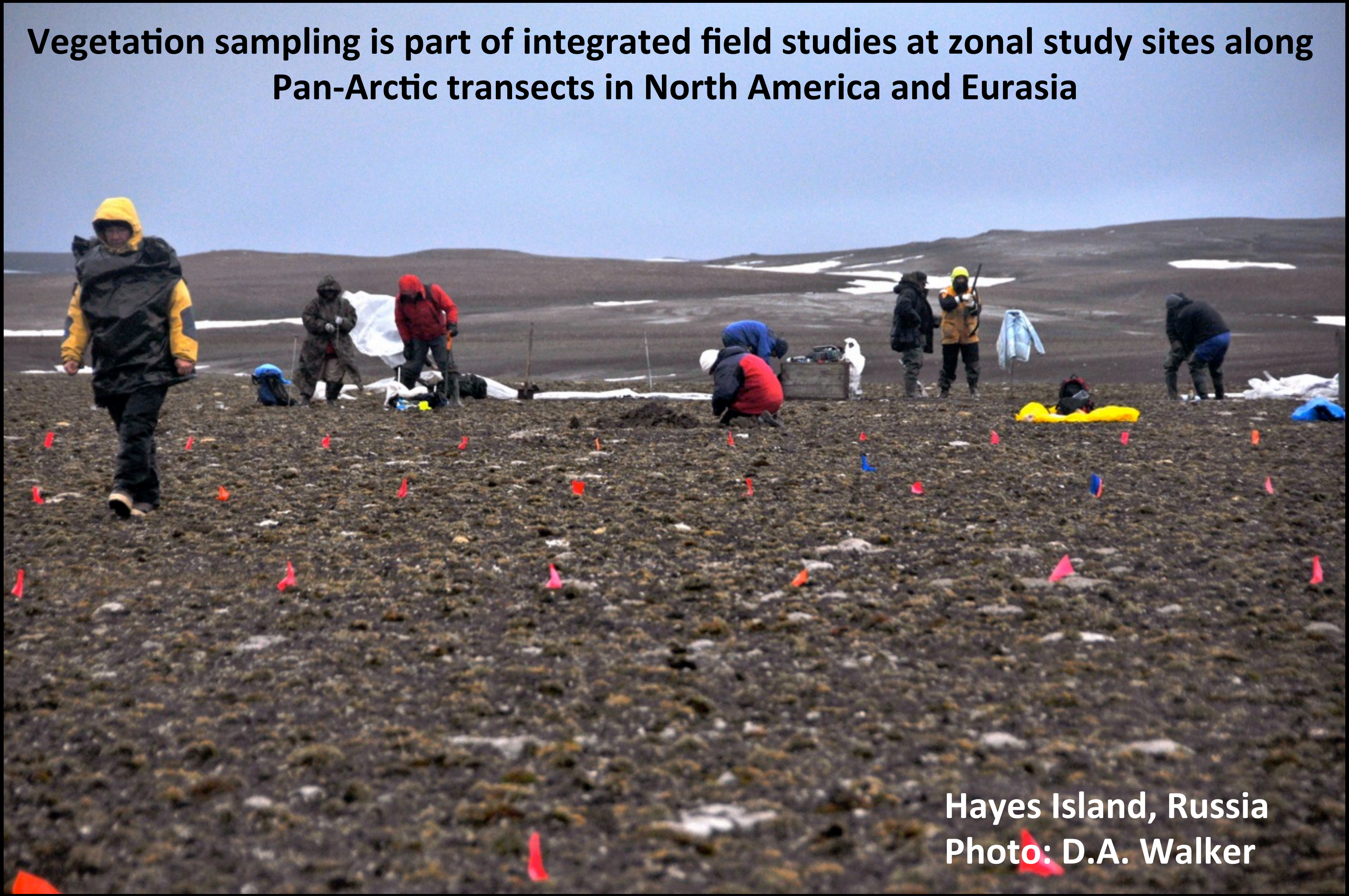
Raynolds, M. K., D. A. Walker, H. E. Epstein, J. E. Pinzon, and C. J. Tucker. 2012. A new estimate of tundra-biome phytomass from trans-Arctic field data and AVHRR NDVI. Remote Sensing Letters 3:403–411.

Choosing sample locations at the global scale

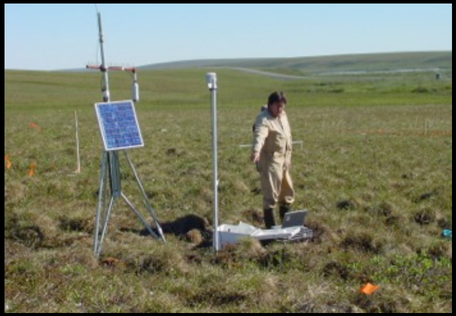
- Key is to sample zonal vegetation.
- Circumpolar Arctic Vegetation Map portrays mainly zonal vegetation of the Arctic Tundra Zone with some large areas of of azonal complexes (wetlands, and mountainous areas).

Walker, D. A., M. K. Raynolds, F. J. A. Daniels, E. Einarsson, A. Elvebakk, W. A. Gould, A. E. Katenin, S. S. Kholod, C. J. Markon, E. S. Melnikov, M. N. G, S. S. Talbot, B. A. Yurtsev, CAVM Team. 2005. The Circumpolar Arctic Vegetation Map. Journal of Vegetation Science 16:267–282.

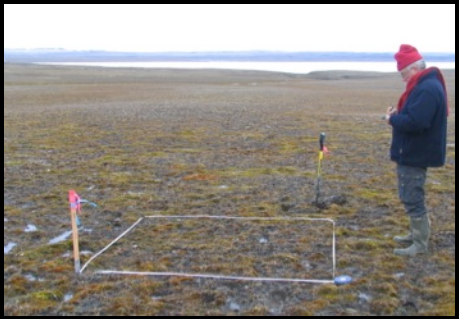
If the question is how does climate affect general vegetation patterns, focus on <u>Zonal</u> sites.



Sampling teams visit the sites together and simultaneously collect data from the same piece of land at the same time.



Climate



Relevé

Soils

NDVI and LAI

Point sampling

Biomass

Permafrost boreholes

Active layer

Sampling strategy for zonal sites along the Eurasia Arctic Transect

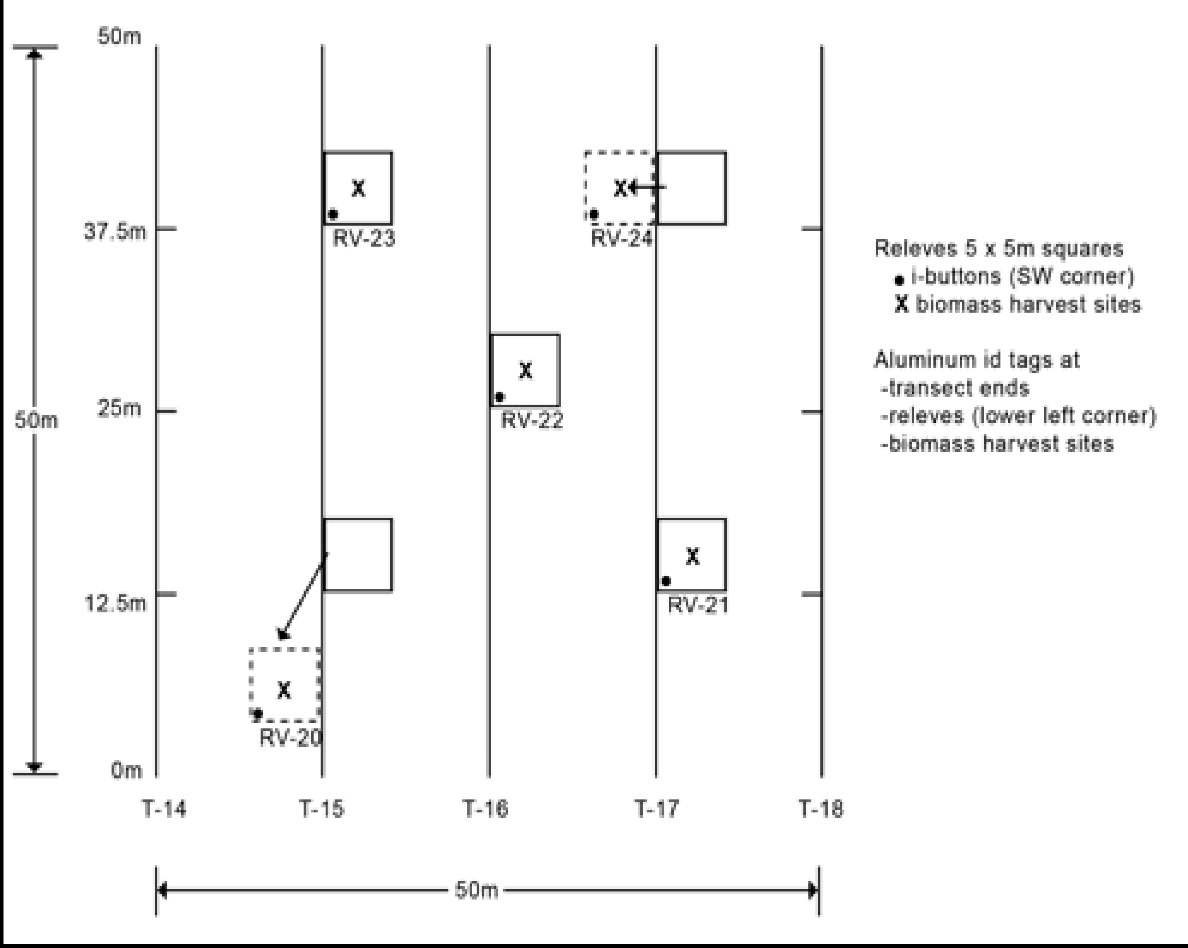
Centrally locate 50-m sites in large patches of zonal vegetation.

Sites on loamy and sandy soils.

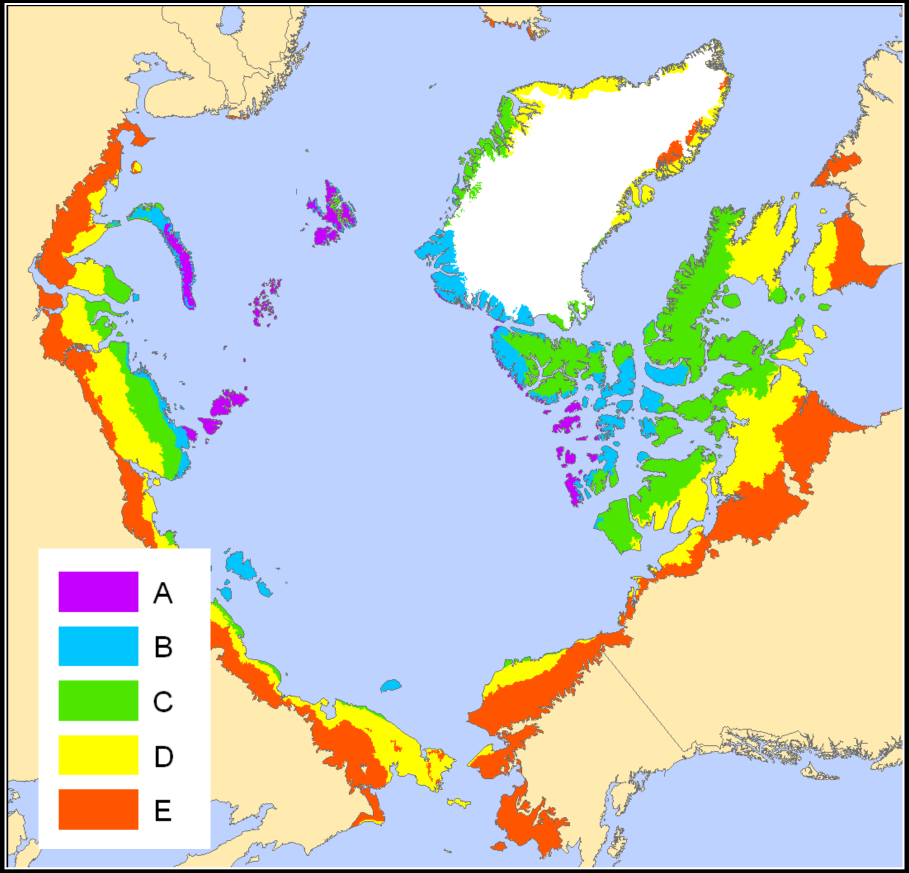
Transects: 5 50-m transects for LAI, active layer, NDVI, quantitative cover measurements.

Relevés and clip harvest: 5 5x5-m relevés with central biomass harvest site (adjusted to ensure sampling zonal vegetation).

Soil pit: 1 soil pit at each site.

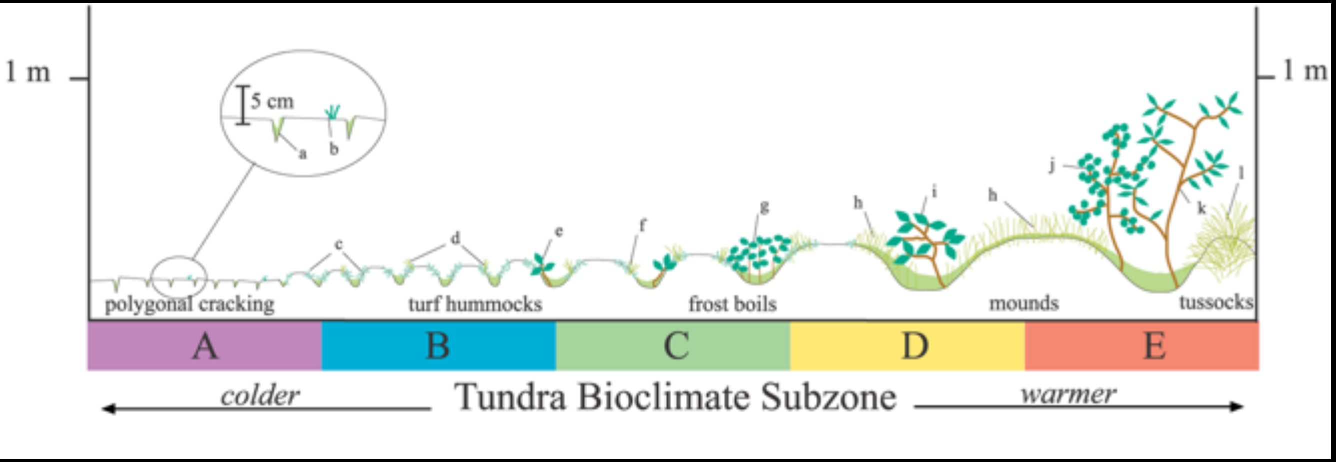


Arctic bioclimate subzones



Dominant plant growth forms on zonal sites in each subzone

A – mosses, liverworts and lichens with some grasses and forbs
B – rushes and prostrate dwarf shrubs with mosses, liverworts and lichens
C – hemiprostrate and prostrate dwarf shrubs with bryophytes and lichens
D – sedges, erect and prostrated dwarf shrubs with bryophytes and lichens
E – tussock sedges, low and erect dwarf shrubs with bryophytes and lichens



Russian approach to zonation of the Arctic

- Based on geobotanical subdivisions first proposed in the 1930s (Gorodkov 1935) and modified by Alexandrova, Andreeva, Sochava, Yurtsev and others.

- Zones and subzones are characterized by the vegetation and soil that best express the regional climate.

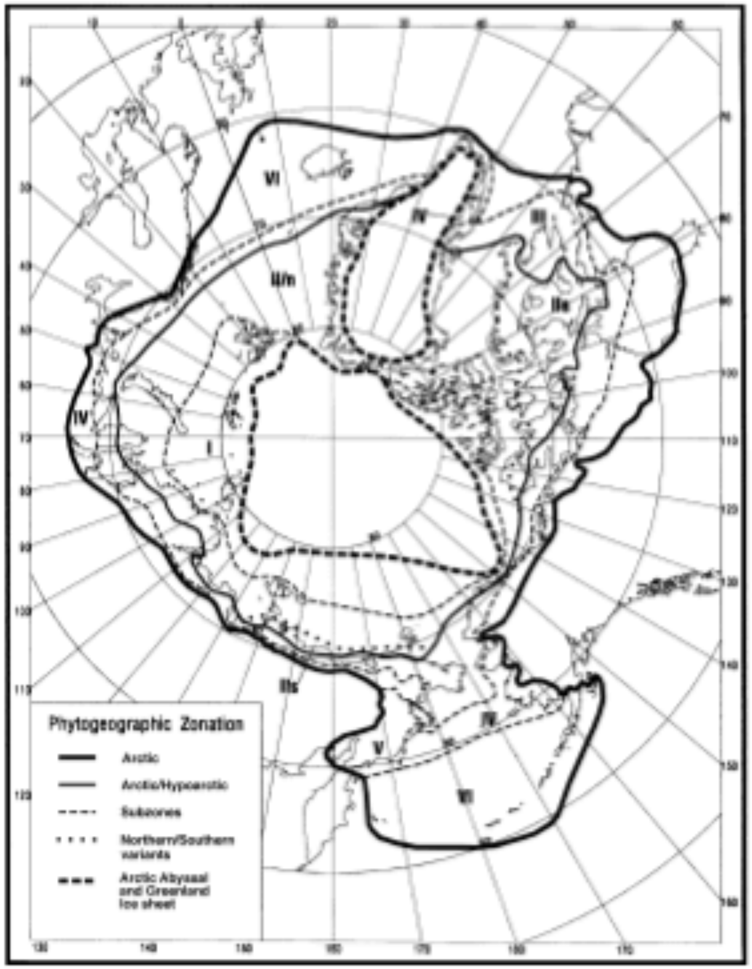
B.N. Gorodkov (1890-1953)

Russian zonal and phytogeographic framework

- **The CAVM followed the approach of Yurtsev (1978, 1994, 1995) and modified by Conservation of Arctic Flora and Fauna project (CAFF) (Elvebakk et al. 1999).**

B.A. Yurtsev (1932-2004)

Yurtsev's (1994) phytogeographic and floristic subdivisions of the Arctic

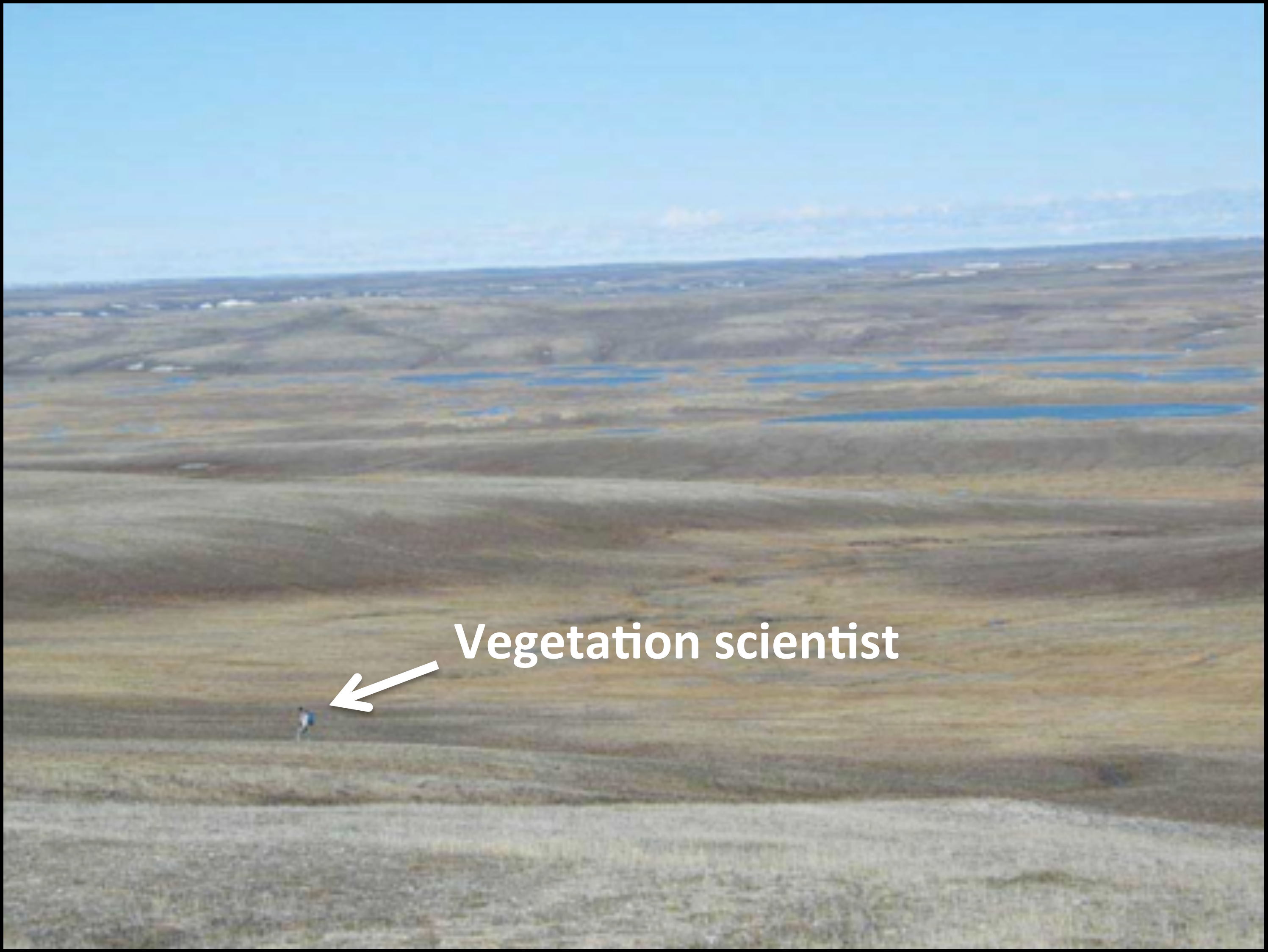


Z

Real landscapes are much more complex than the map.

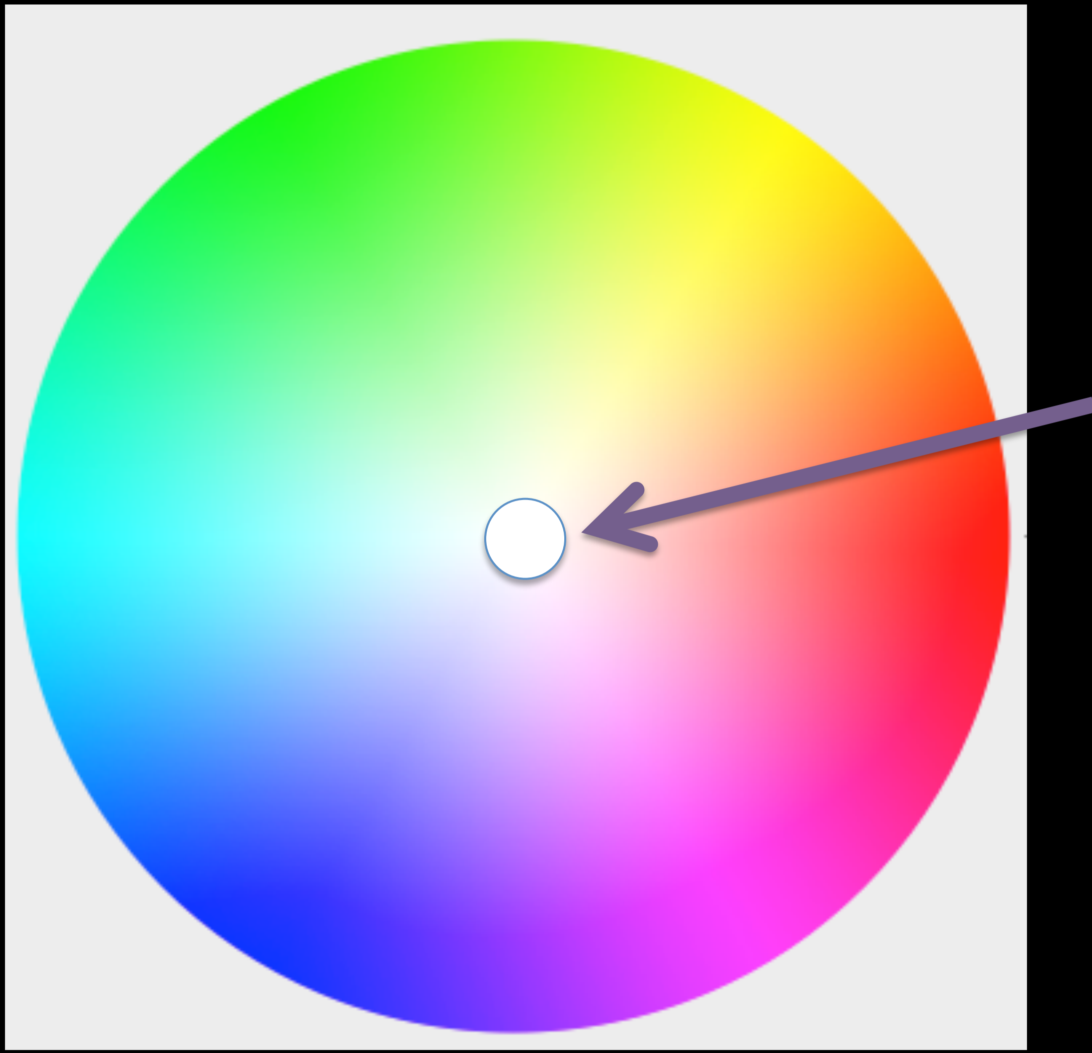
Thompson River vicinity, Banks Island, Canada
Photo: D.A. Walker

Real landscapes are much more complex than the map.



Thompson River vicinity, Banks Island, Canada
Photo: D.A. Walker

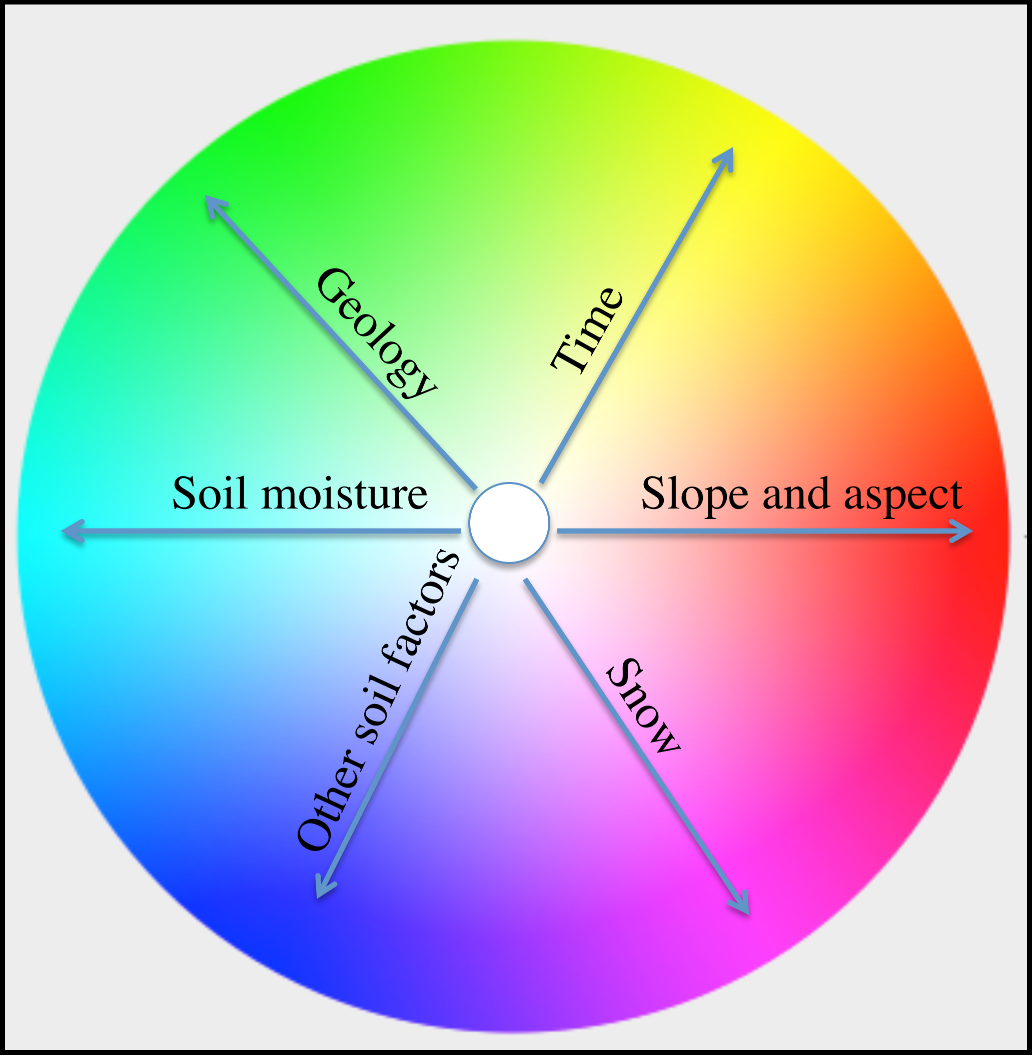

Where’s the zonal vegetation?



Zonal state is a tiny fraction of total suite of possible states of vegetation.

- **Zonal state:** point in a landscape where climate is the primary controlling variable and other site factors are moderate.
- The *plakor* in Russian literature (Vysotsky 1909, etc., Razzhivin 1999).
- Mesic vegetation on loamy soils with no extremes of snow, soil chemistry, soil texture, water, disturbance etc.

Colors represent vegetation along various gradients away from the zonal situation.



- **Many factors modify the zonal state, often making it difficult to locate the zonal situation in complex landscapes.**
- **In some situations (e.g. highly modified landscapes) true zonal sites may not be present.**

What to do about the rest of the vegetation continuum? Complexity of productivity at all scales

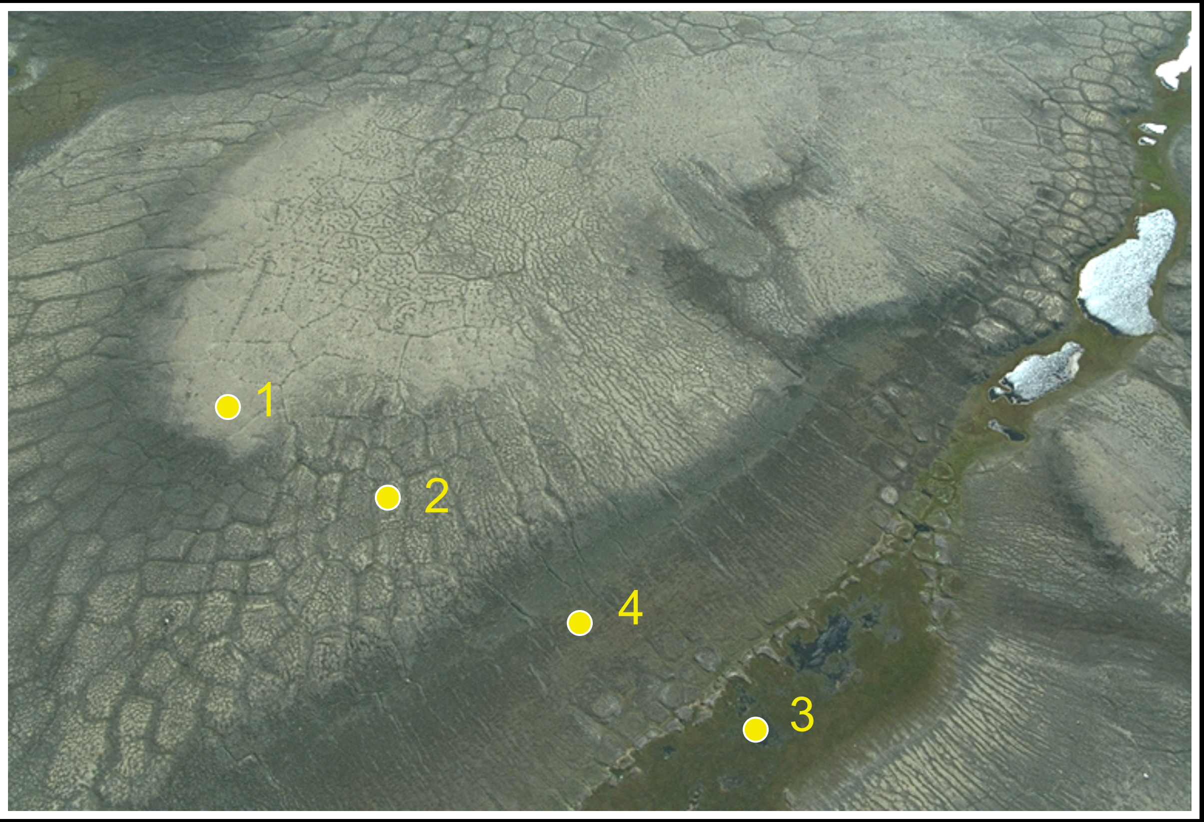
Landscape scale

Landscape units:

- **Floodplain with riparian chronosequences.**
- **Uplands with glacial chronosequences and hillslope toposequences.**
- **Bedrock outcrops of differing geology.**
- **Substrates of different chemistry and texture.**

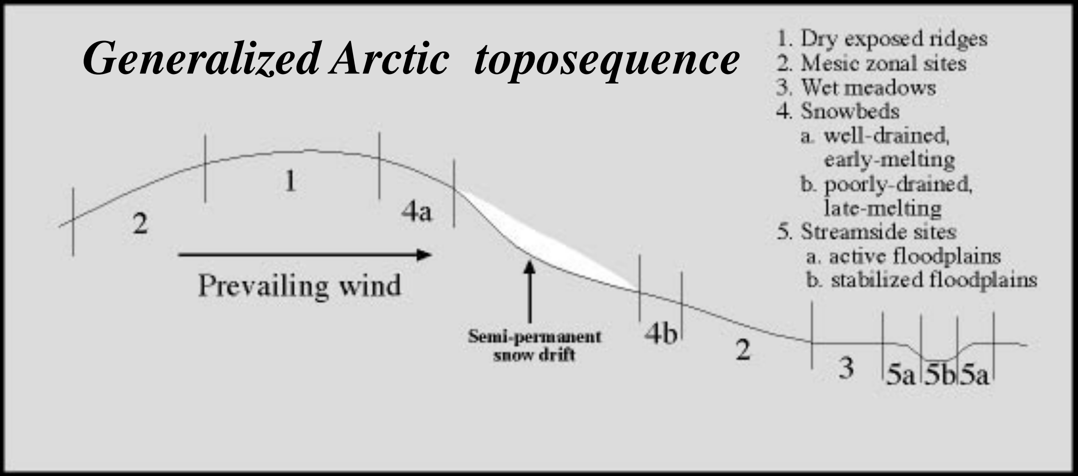
Subzone E landscape, Kuparuk River, Northern Alaska
Photo: D.A. Walker

Complexity at hillslope scale

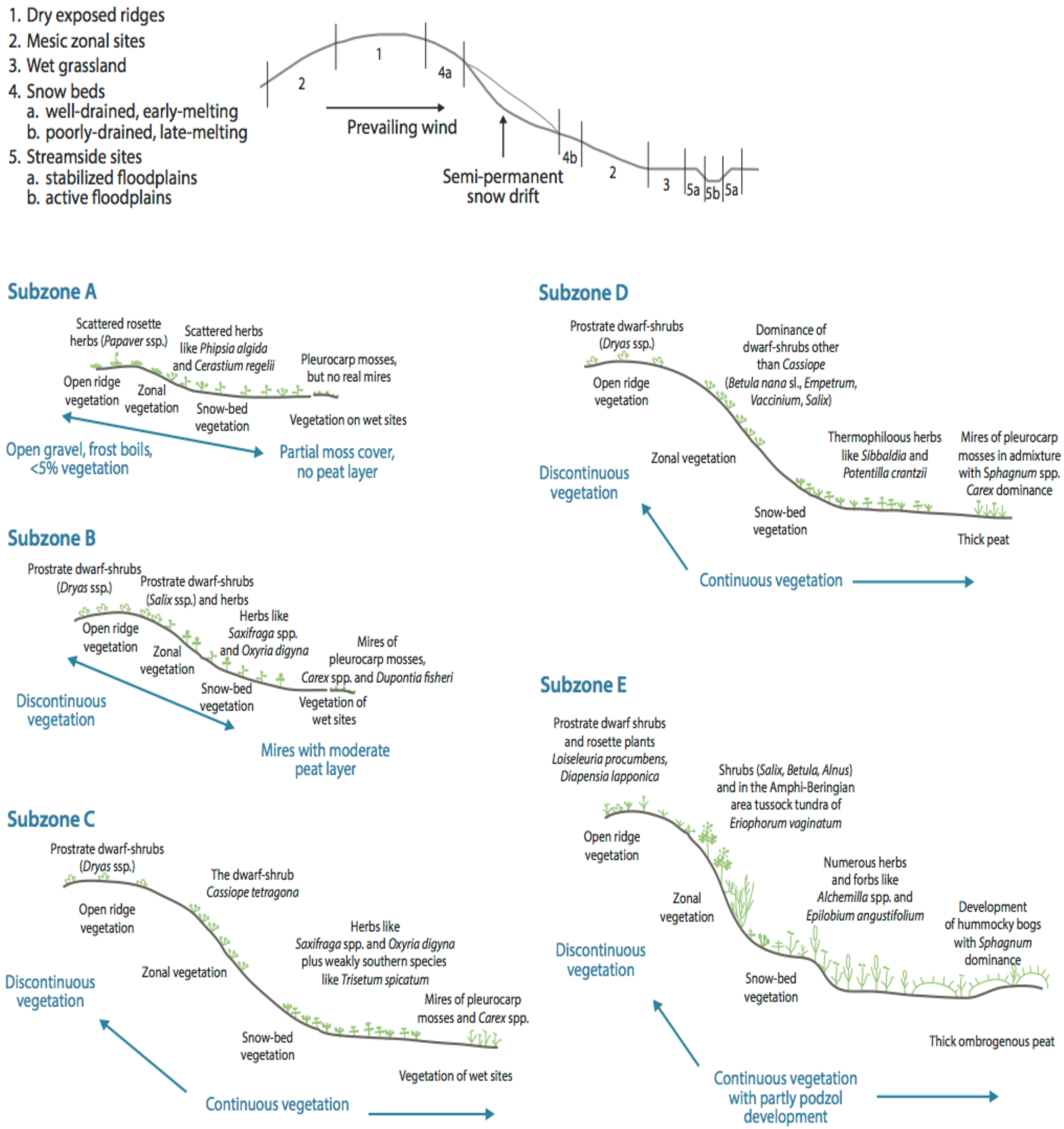


1. **Hill crest:** Dry barrens with scattered forbs, sedges, lichens
2. **Upper backslope:** Zonal *Dryas* community.
3. **Footslope:** Wet sedge meadow
4. **Snowbed:** *Cassiope tetragona* community

Topesequence near East Wind Lake, Ellesmere Island:
Photo: D.A. Walker



Typical toposequences in Arctic bioclimate subzones

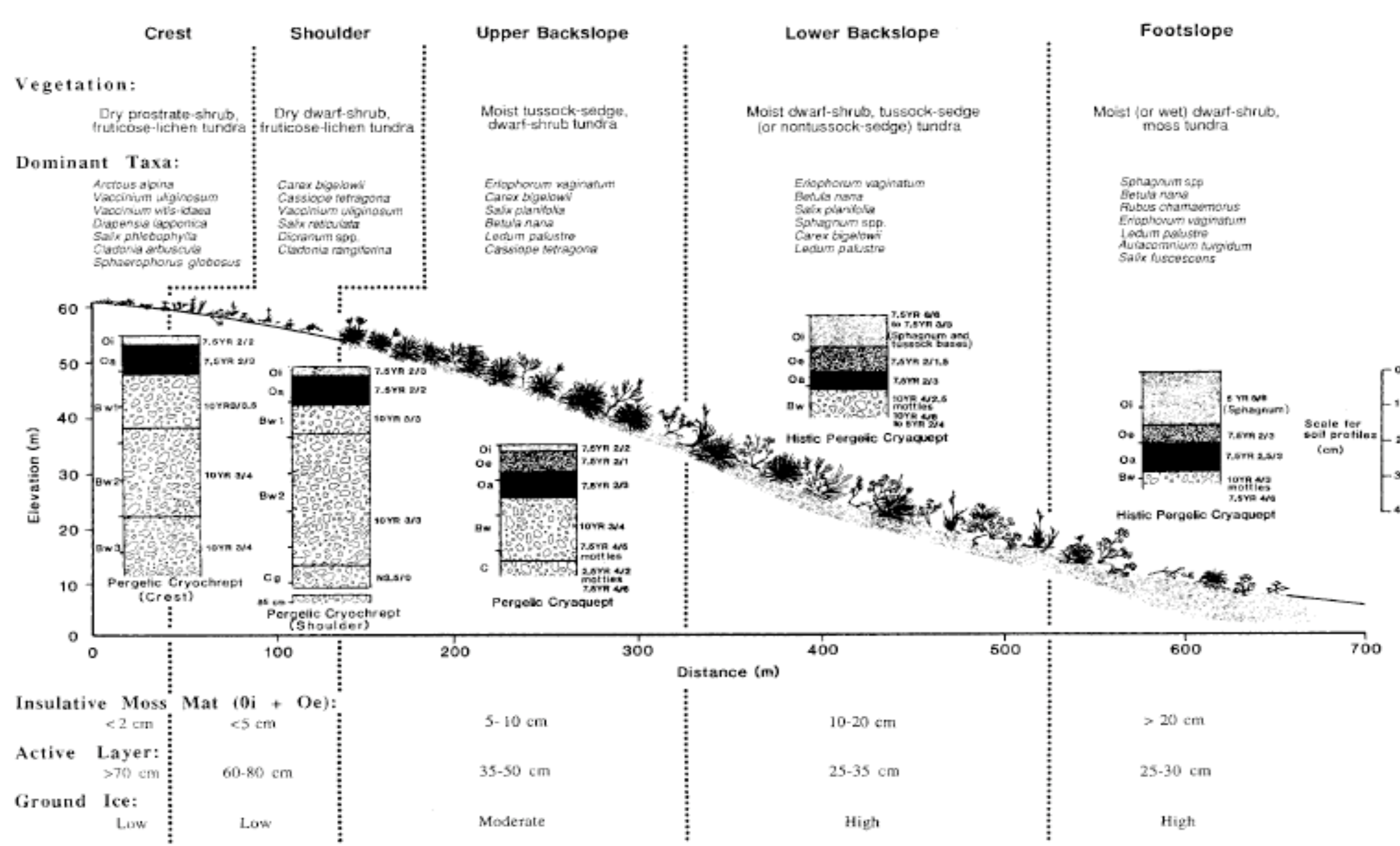


Adapted from: Elvebakk A 1999. Bioclimatic delimitation and subdivision of the Arctic The Species Concept in the High North - A Panarctic Flora Initiative (Oslo: The Norwegian Academy of Science and Letters) 81-112

Toposequences at Imnavait Creek, Alaska, bioclimate subzone E, (ice-rich permafrost)

Imnavait Creek, Subzone E, northern Alaska,
Photo: D.A. Walker

Subzone E, Imnavait Creek, AK toposequence



Walker, D.A., Walker, M.D. 1996. Terrain and vegetation of the Imnavait Creek Watershed. **in** *J. F. Reynolds, J. D. Tenhunen (eds.) Landscape Function: Implications for Ecosystem Disturbance, a Case Study in Arctic Tundra*. Springer-Verlag. New York. 120 pp. 73-108.

Complexity at plot scale

- Abundance of non-sorted circles (frost boils with sparse vegetation).
- Peaty tundra with thick moss between the circles.

Mesic Subzone D tundra near Ambarchik, the mouth of the Kolyma River, Russia. Photo: D.A. Walker

Carbon is concentrated in the cracks between small polygons.

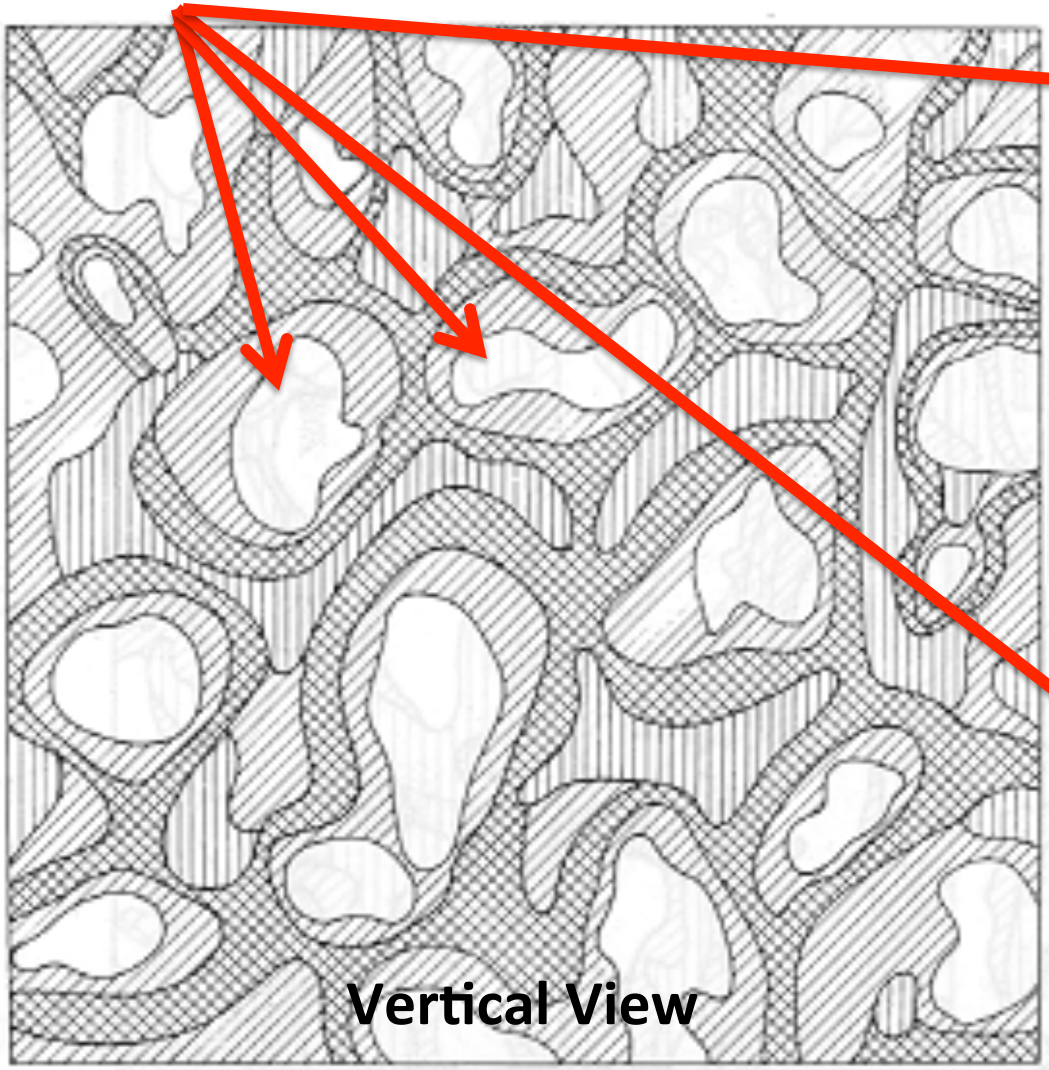
Nonsorted circles, Ostrov Belyy, Russia.

After removal of top 10 cm of soil.

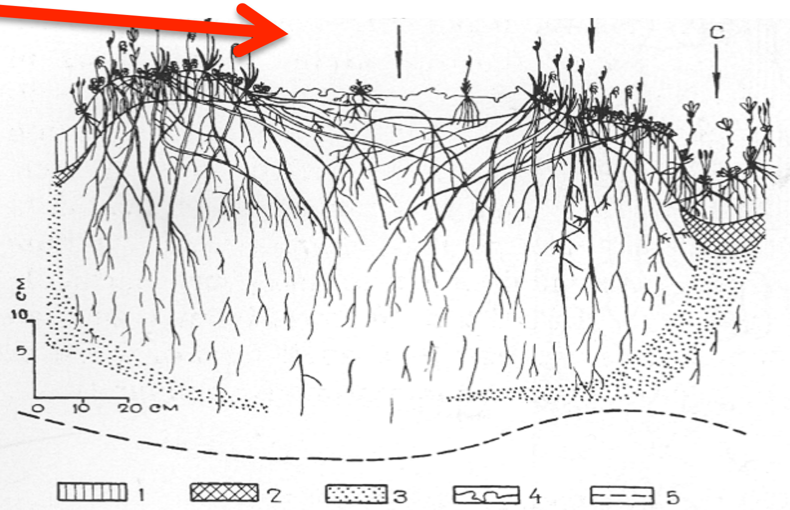
Circles are situated in the centers of 60-90-cm diameter <u>nonsorted polygons with cracks.</u>

Vegetation on non-sorted circles

Barren centers of circles



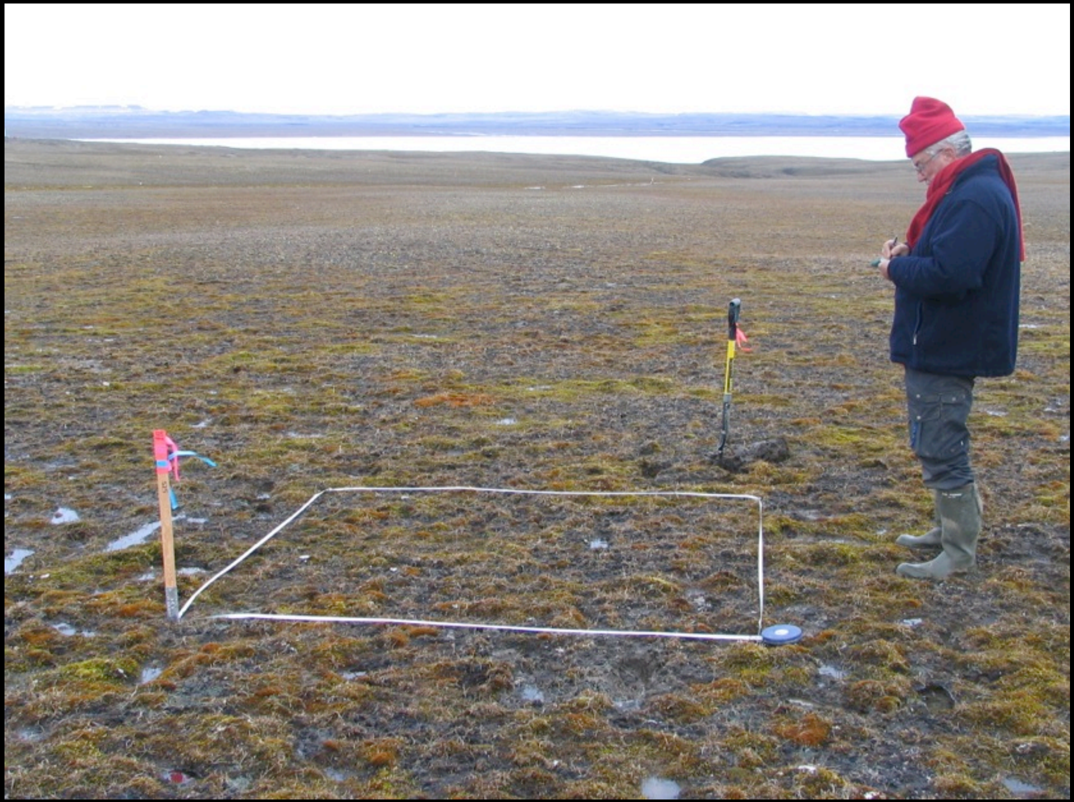
Cross section of one circle



Map and cross-section: Nadya Matveyeva 1998. Photo: D. A. Walker, 1971.

Vegetation Sampling

- **Review of relevé sampling approach**
- **Biomass and various related indices (LAI, NDVI)**



Fred Daniels sampling a relevé at Isachsen, Canada

Braun-Blanquet relevé approach for sampling vegetation

- The single most useful sampling approach for vegetation classification, analysis, and classification.
- Simple method that gives a detailed data on vegetation composition and structure.
- Data can be used for a wide variety of purposes as long as the properties of the data and sampling approach are understood.
- Used worldwide over a long time period (early 1900s to present).

Josias Braun-Blanquet
1884-1980

Relevé Data: floristic data at the species level

- Requires knowledge of flora.
- Nonvascular plants are particularly important in the Arctic.

Oxytropis nigrescens, Photo József Geml

Oncophorus virens, Photo Michael Lüth

Dactylina arctica, Photo Stephen & Sylvia Sharnoff ©

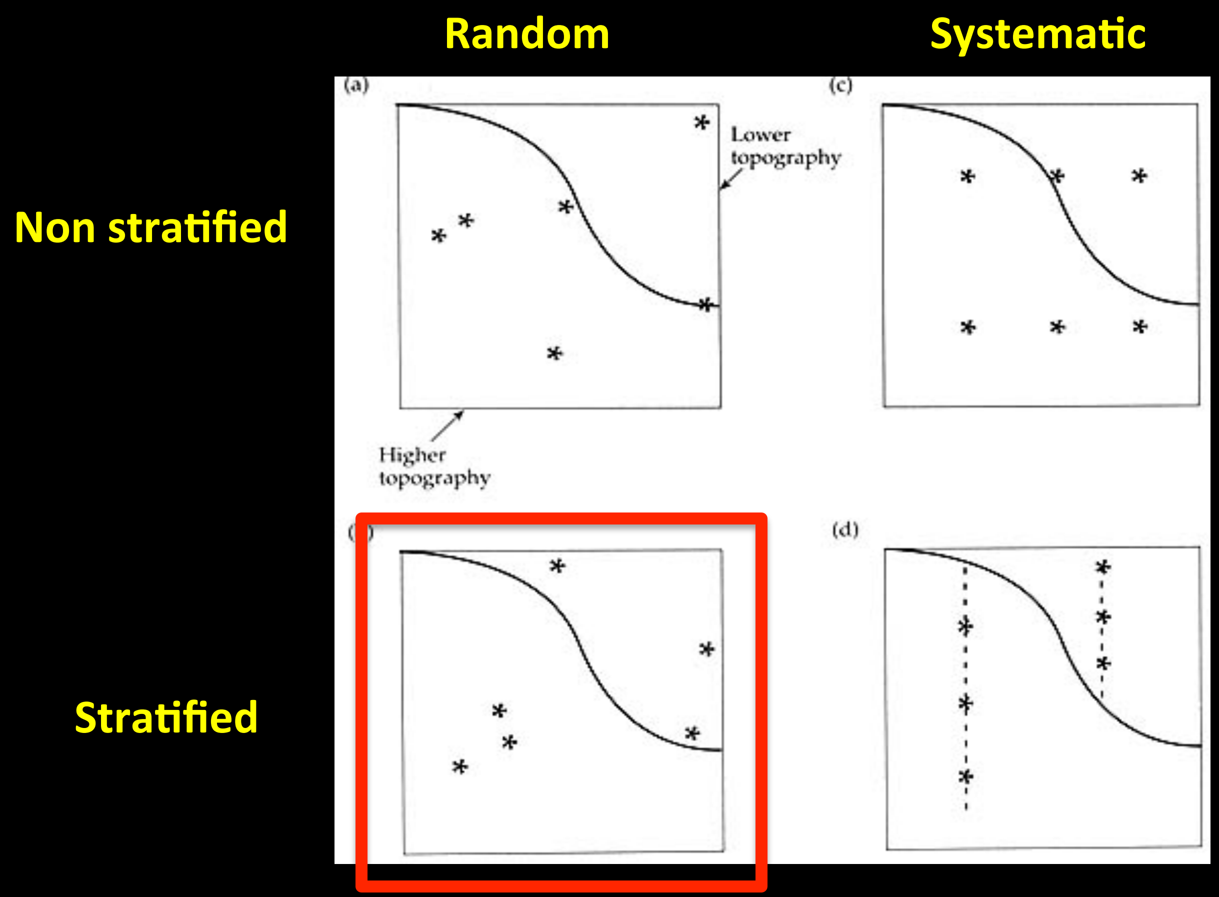
Centralized Replicate Sampling

- A subjective approach, where sites are consciously chosen as representative of units that are recognized to occur broadly in the landscape.
- Sample sites are centrally located within representative homogeneous areas of predetermined vegetation types.
- Sampling is replicated in many similar areas to obtain a large sample size of similar vegetation.

Compare with objective sampling

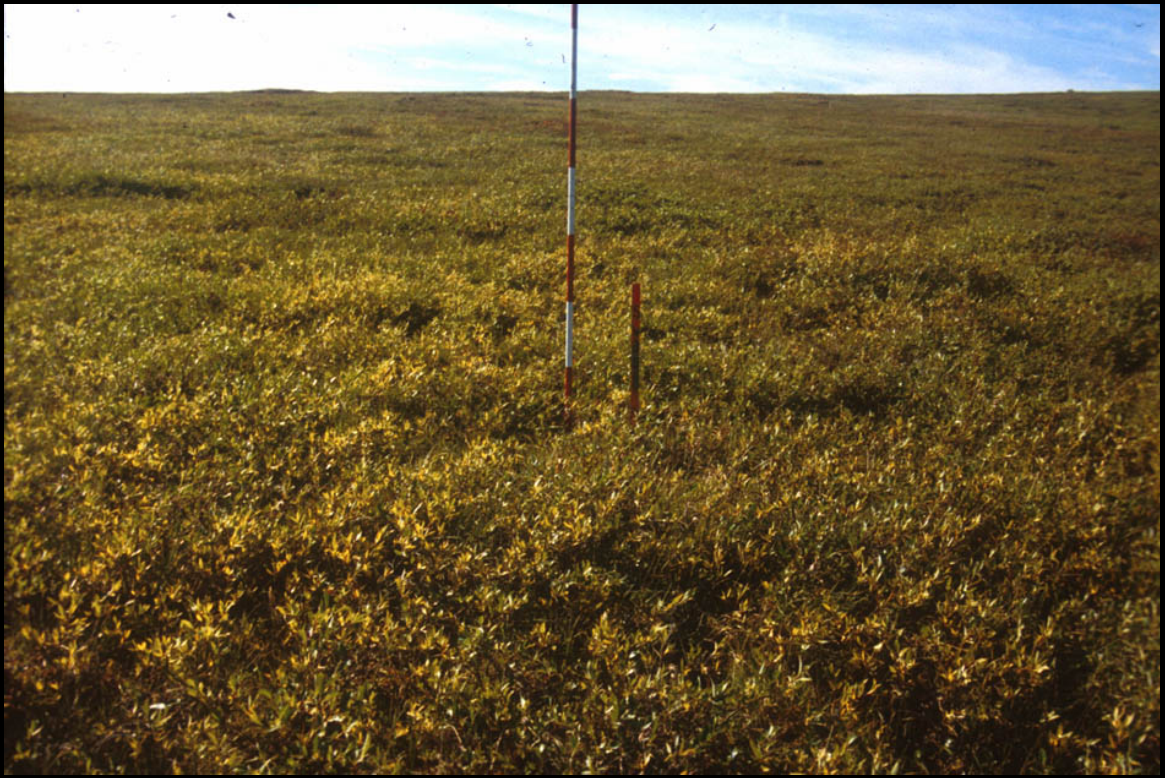
Stratified random – favorite objective method these days…

But there are problems:
1) Most schemes of stratification use terrain classification that does not apply at the scale of sampling.
2) The actual environment is much more diverse and complex than the stratification scheme.
3) Impractical for large regions.



Desirable qualities of relevés:

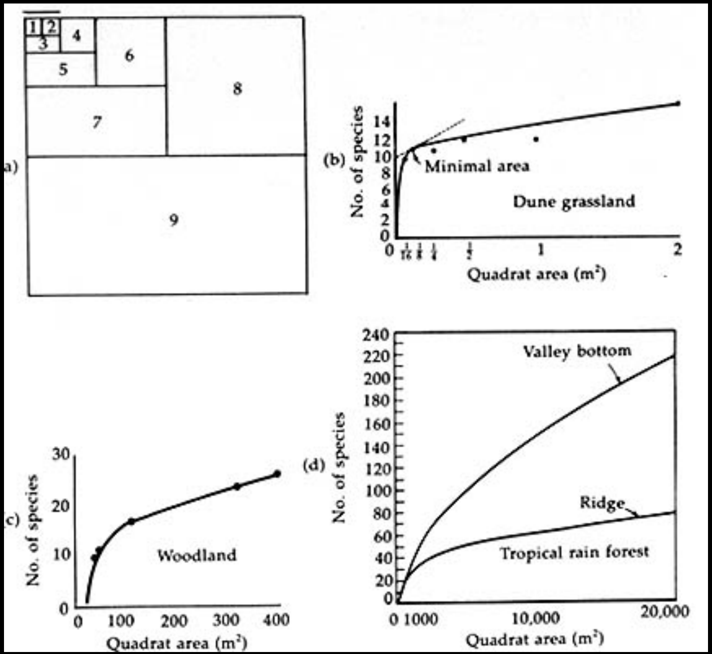
1. Homogeneous.
2. Representative of many areas in the landscape
3. Large enough to contain the great majority of species in the community



Relevé in *Salix pulchra-Eriophorum angustifolium* community.
Imnavait Creek, AK

Plot size

Minimal area method



Mueller-Dombois and Ellenberg, 1974

Tables based on previous studies

Table 9-1 Minimal areas for various vegetation types. From *Aims and Methods of Vegetation Ecology*. Mueller-Dombois and Ellenberg. Copyright © 1974 John Wiley and Sons, Inc. Reprinted by permission.

Type	Minimal area (m^2)
Tropical rain forest	1000–50,000
Temperate forest:	
Overstory	200–500
Undergrowth	50–200
Dry temperate grassland	50–100
Heath	10–25
Wet meadow	5–10
Moss and lichen communities	0.1–4

Example of a European relevé protocol, header data

TABLE III

Protocol of a relevé (translated from MELTZER & WESTHOFF 1942)

Nr. 39462. 1st August 1939. Terschelling, Bessenplak S of beacon near beach mark 6. Gridnr. G5.61.43 in IVON-system (Institute for Vegetation Research in the Netherlands). Stand very uniform, Empetrum heath on slope of 6 m tall parabolic dune, exposition NNE, inclination 30°.

Habitat: shadowed, moist soil, by day not strongly heated and rarely desiccating. Slight shifting of sand. Little human and animal influence.

Profile: A_0: 2 cm semi-decayed material.
A_1: 5 cm dark humus containing sand.
C: bright, white dune sand.

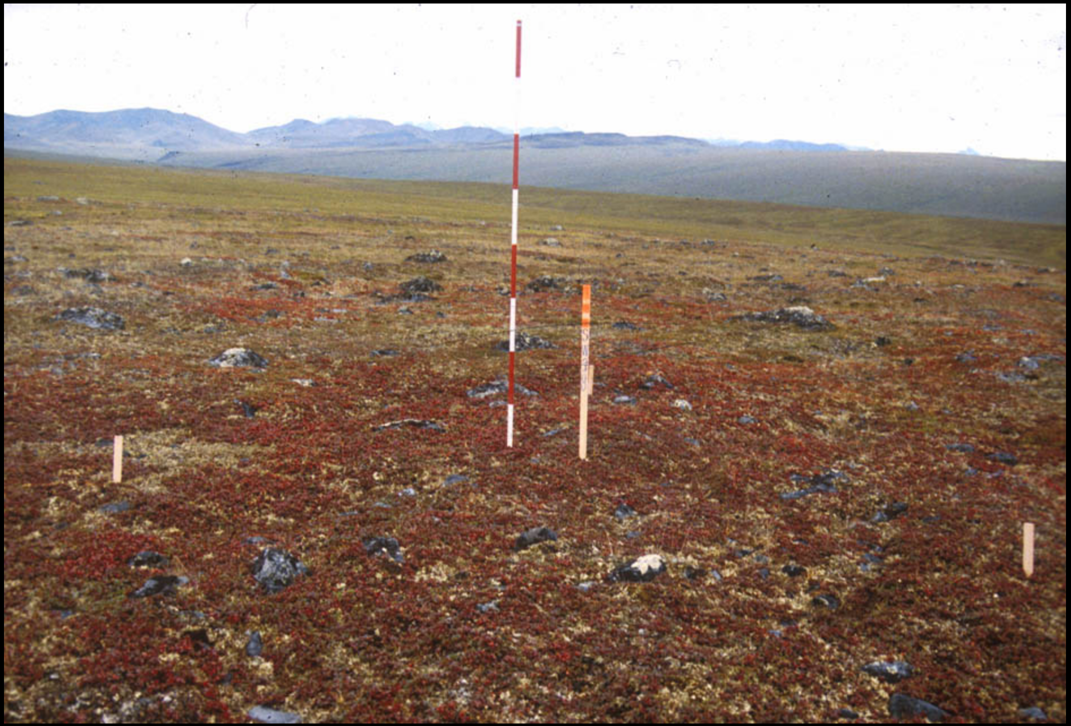
Sample plot 100 sq m.

Herb layer cover 100 %, 20–40 cm			
Polypodium vulgare	2.3	v.	●
Empetrum nigrum	4.4	fr.	●
Hieracium umbellatum	1.1–2	fl.	●
Festuca rubra subvar. arenaria	+.1	fr.	●
Hypochoeris radicata	+.1	fr.	●
Calamagrostis epigeios	+.1	fl.	●
Jasione montana	+.1	fl.	●
Carex arenaria	1.1	v.	○
Ammophila arenaria	2.2	v.	○
Salix repens	+.2	fr.	●
Viola canina var. dunensis	r	v.	○
Moss layer cover 100 %, 2–5 cm			
Hypnum cupressiforme var. ericetorum	3.3	v.	○
Pleurozium schreberi	3.3	v.	○
Dicranum scoparium	2.3	v.	○
Mnium hornum	2.3	v.	●
Lophocolea bidentata	2.2	fr.	●
Eurhynchium stokesii	+.3	v.	○
Plagiothecium denticulatum	+.2	fr.	●
Polytrichum juniperinum	+.3	v.	○
Peltigera canina	+.2	v.	●
Parmelia physodes	+.1	v.	○
Cladonia alcicornis	+.2	v.	○

- Relevé No.,
- Date,
- Location,
- Site description,
- Habitat description
- Brief soil description
- Area of plot

Permanent plots

- **Long-term studies: change over time, successional processes, climate change, or disturbance.**
- **Allow for ancillary data (NDVI, LAI, snow, trace gases, etc.) collection. Revisits during winter.**
- **Methods:**
  - **GPS, and high resolution satellite data have revolutionized accurate geo-location of plots.**



Permanent plot, Imnavait Creek, AK,
Arctous alpina-Salix phlebophylla community.

Releve # HV-6   Date 7/21/94

ARCSS--Happy Valley, Alaska 1994 — **Site Description**

Recording personnel: NAA
Weather: overcast, warm, calm - rained lots yesterday, last night
Study area description: fluvial terrace ~100m west of runway, across Dalton from HV camp
Slope (deg): 0   Aspect: —   Thaw depth: ≥ 30 cm can't measure due to too much stoniness
Vegetation (describe moisture status, dominant species in each layer, dominant growth forms, and physiognomic unit):
dry dryint bigarc tomnit stetom dwarf shrub forb tundra

Landforms
1 Hills (including kames and moraines)
2 Talus slope
3 Colluvial basin
(4) Glaciofluvial and other (fluvial terraces)
5 Marine terrace
6 Floodplains
7 Drained lakes and flat lake margins
8 Abandoned point bars and sloughs
9 Estuary
10 Lake or pond
11 Stream
12 Sea bluff
13 Lake bluff
14 Stream bluff
15 Sand dunes
16 Beach
17 Disturbed
18 ______
19 ______
20 ______
21 ______

Surficial Geology (Parent Material)
1 Glacial tills
2 Glaciofluvial deposits
3 Active alluvial sands
4 Active alluvial gravels
(5) Stabilized alluvium (sands & gravels)
6 Undifferentiated hill slope colluvium
7 Basin colluvium and organic deposits
8 Drained lake or lacustrine organic deposits
9 Lake or pond organic, sand, or silt
10 Undifferentiated sands
11 Undifferentiated clay
12 Roads and gravel pads
13 ______
14 ______
15 ______
16 ______

Surficial Geomorphology
1 Frost scars
2 Wetland hummocks
3 Turf hummocks
4 Gelifluction features
5 Strangmoor or aligned hummocks
6 High- or flat-centered polygons
7 Mixed high- and low-centered polygons
8 Sorted and non-sorted stripes
9 Palsas
10 Thermokarst pits
(11) Featureless or with less 20% frost scars
12 Well-developed hillslope water tracks and small streams > 50 cm deep
13 Poorly developed hillslope water tracks, < 50 cm deep
14 Gently rolling or irregular microrelief
15 Stoney surface
16 Lakes and ponds
17 Disturbed
18 ______
19 ______
20 ______
21 ______

Microsites
1 Frost-scar element
2 Inter-frost scar element
3 Strang or hummock
4 Flark, interstrang, or interhummock area
5 Polygon center
6 Polygon trough
7 Polygon rim
8 Stripe element
9 Inter-stripe element
10 Point bar (raised element)
11 Slough (wet element)
(14) (12) none
13 ______
14 ______
15 ______

Site Moisture (modified from Komárková 1983)
1 Extremely xeric - almost no moisture; no plant growth
2 Very xeric - very little moisture; dry sand dunes
3 Xeric - little moisture; stabilized sand dunes, dry ridge tops
4 Subxeric - noticeable moisture; well-drained slopes, ridges
(5) Subxeric to mesic - very noticeable moisture; flat to gently sloping
6 Mesic-moderate moisture; flat or shallow depressions
7 Mesic to subhygric - considerable moisture; depressions
8 Subhygric - very considerable moisture; saturated but with < 5% standing water < 10 cm deep
9 Hygric - much moisture; up to 100% of surface under water 10 to 50 cm deep; lake margins, shallow ponds, streams
10 Hydric - very much moisture; 100% of surface under water 50 to 150 cm deep; lakes, streams

Soil Moisture (from Komárková 1983) at 10 cm (B6-30 A)
1 Very dry - very little moisture; soil does not stick together
2 Dry - little moisture; soil somewhat sticks together
3 Damp - noticeable moisture; soil sticks together but crumbles
4 Damp to moist - very noticeable moisture; soil clumps
(5) Moist - moderate moisture; soil binds but can be broken apart
6 Moist to wet - considerable moisture; soil binds and sticks to fingers
7 Wet - very considerable moisture; water drops can be squeezed out of soil
8 Very wet - much moisture can be squeezed out of soil
9 Saturated - very much moisture; water drips out of soil
10 Very saturated - extreme moisture; soil is more liquid than solid

Glacial Geology
1 Till
2 Outwash
3 Bedrock
(4) alluvium
5 ______
6 ______
7 ______

Topographic Position
1 Hill crest or shoulder
2 Side slope
3 Footslope or toeslope
(4) Flat
5 Drainage channel
6 Depression
7 Lake or pond

Soil Units
1 Pergelic Cryorthent, acid
2 Pergelic Cryopsamment
3 Pergelic Cryohemist, euic
4 Pergelic Cryosaprist, euic
5 Lithic Pergelic Cryosaprist
6 Pergelic Cryofibrist, euic
7 Histic Pergelic Cryaquept, acid
8 Histic Pergelic Cryaquept, nonacid
9 Pergelic Cryaquept, acid
10 Pergelic Cryaquept, nonacid
11 Pergelic Cryochrept
12 Pergelic Cryumbrept
13 Ruptic-Lithic Cryumbrept
14 Pergelic Cryaquoll
15 Histic Pergelic Cryaquoll
16 Pergelic Cryoboroll
17 Pergelic Cryofluvent
18 ______
19 ______
20 ______

Exposure Scale
1 Protected from winds
2 Moderate exposure to winds
(3) Exposed to winds
4 Very exposed to winds

Estimated Snow Duration
1 Snow free all year
2 Snow free most of winter; some snow cover persistsafter storm but is blown free soon afterward
3 Snow free prior to melt out but with snow most of winter
(4) Snow free immediately after melt out
5 Snow bank persists 1-2 weeks after melt out
6 Snow bank persists 3-4 weeks after melt out
7 Snow bank persists 4-8 weeks after melt out
8 Snow bank persists 8-12 weeks after melt out
9 Very short snow free period
10 Deep snow all year

Animal and Human Disturbance
0 No sign present
(1) Some sign present; no disturbance - some caribou scat, one bone remains (old), ptarmigan scat, fox scat
2 Minor disturbance or extensive sign
3 Moderate disturbance; small dens or light grazing
4 Major disturbance; multiple dens or noticeable trampling
5 Very major disturbance; very extensive tunneling or large pit

Stability
(1) Stable
2 Subject to occasional disturbance
3 Subject to prolonged but slow disturbance such as solifluction
4 Annually disturbed
5 Disturbed more than once annually

Other notes: ______

Site-factor data form

Soils

- **Key to understanding vegetation patterns.**
- **Work in conjunction with a soil scientist unless you have training.**
- **The minimum effort should include:**
  - **soil pit or plug of soil (photo at right)**
  - **quick description of horizons,**
  - **soil collection for later analysis**
    - **a large handful) of soil from the top mineral horizon (generally 10 cm depth). Analyzed for pH, percent soil moisture, soil texture, soil color, percent organic matter, soil nutrients (N, P, K).**
    - **Other physical and chemical characteristics useful for specific study.**

Prudhoe Bay 2014. Soil from disturbed roadside relevé.

Photographs

Extremely valuable for later reference.

(1) General landscape

(2) Vertical close-ups of the vegetation

(3) Soil profile

Plot

Landscape

Soil

Prudhoe Bay 2014. Disturbed roadside relevé.

Estimates vs. measures of cover

Estimates:
- Most useful for classification.
- Generally used with the Br.-Bl. approach.

Measures:
- Necessary for quantitative measures of change.
- Usually very time consuming.
- Many point sampling approaches.

Both can be done in conjunction with relevés.

Cover-abundance classes

Table 9-2 Cover classes of Braun-Blanquet, Domin-Krajina, and Daubenmire. From *Aims and Methods of Vegetation Ecology*. Mueller-Dombois and Ellenberg. Copyright © 1974 by John Wiley and Sons, Inc. Reprinted by permission.

Braun-Blanquet			Domin-Krajina			Daubenmire		
Class	Range of cover (%)	Mean	Class	Range of cover (%)	Mean	Class	Range of cover (%)	Mean
5	75–100	87.5	10	100	100.0	6	95–100	97.5
4	50–75	62.5	9	75–99	87.0	5	75–95	85.0
3	25–50	37.5	8	50–75	62.5	4	50–75	62.5
2	5–25	15.0	7	33–50	41.5	3	25–50	37.5
1	1–5	2.5	6	25–33	29.0	2	5–25	15.0
†	<1	0.1	5	10–25	17.5	1	0–5	2.5
r	<<1	*	4	5–10	7.5			
			3	1–5	2.5			
			2	<1	0.5			
			1	<<1	*			
			†	<<<1	*			

*Individuals occurring seldom or only once; cover ignored and assumed to be insignificant.

Measuring Cover: Point intercept methods

- Many methods
  - Point quadrats
  - Point frames
  - Laser points
  - Optical point sampling devices

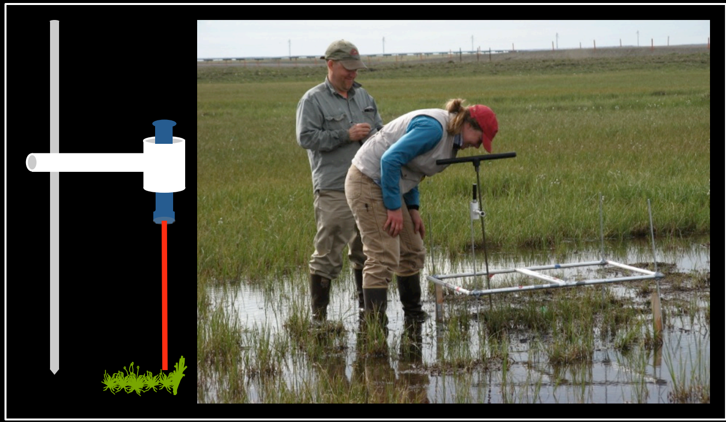
Point intercept methods

Numerous approaches:

- Line transects, point quadrats, point frames, laser point sampling.

Advantages

- objective
- confidence in values (accurate & precise)
- repeatable



Laser-point sampling devise. Courtesy Janet Kidd, ABR.

Disadvantages

- time consuming
- emphasizes most common plants, minimal data on uncommon species

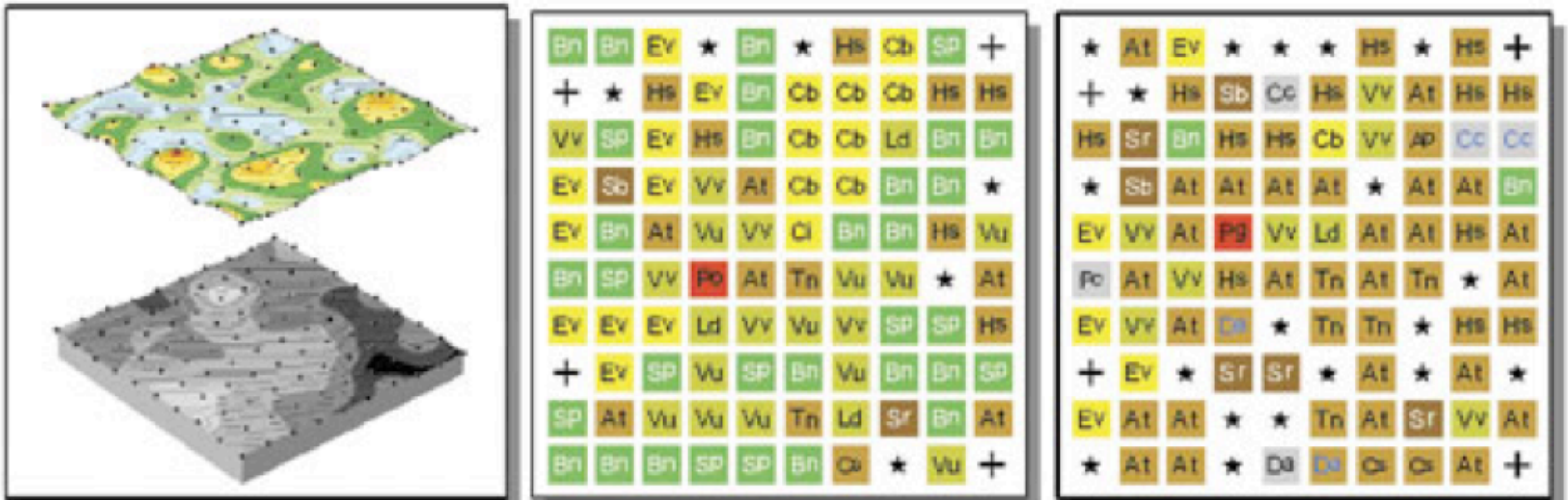
"*best suited to applications such as mine permit baselines and testing for revegetation success, where maximum confidence in absolute cover and repeatability is paramount and information on the full range of individual species' cover values is not.*" (Buckner web site)

Buckner sampler: Optical Sighting Device (OSD)

Point quadrat

Point quadrat grid: data portrayal

Plant canopy and soil topography | **Composition: Top of plant canopy** | **Composition: Bottom of plant canopy**



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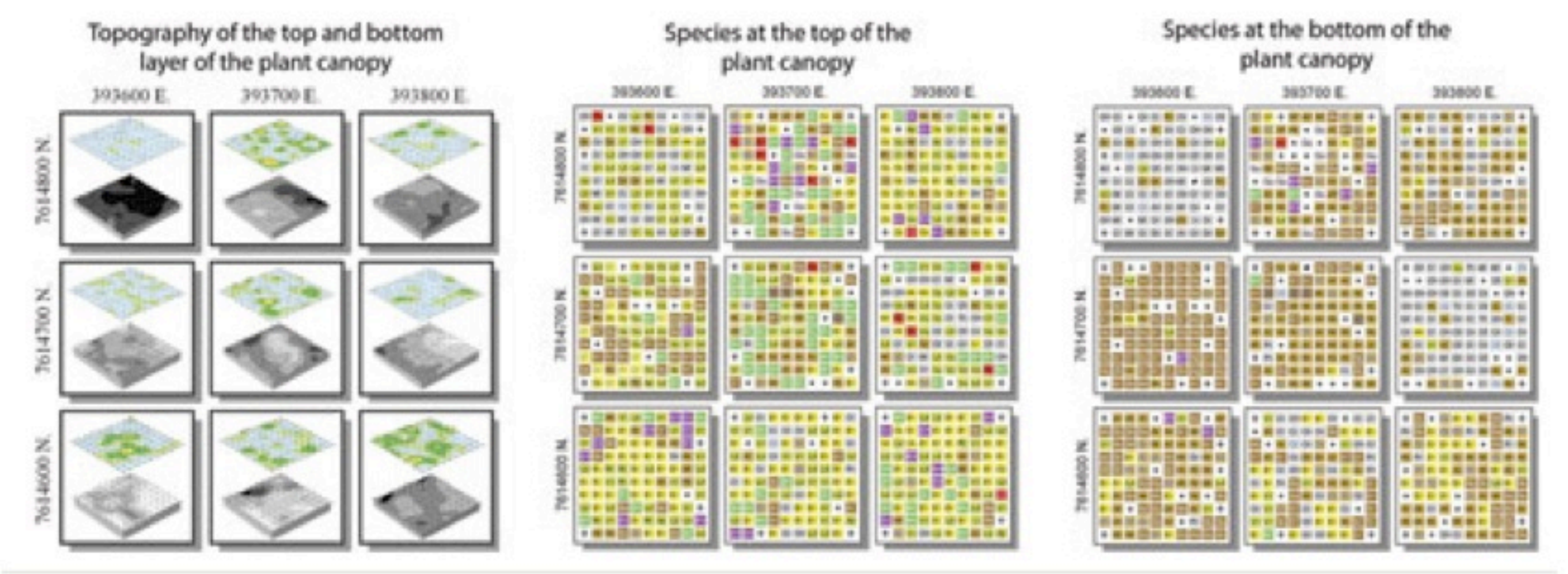
Walker, D.A., Walker, M.D., Gould, W.A., Mercado, J., Auerbach, N.A., Maier, H.A., Neufeld, G.P. 2010. Maps for monitoring changes to vegetation structure and composition: The Toolik and Imnavait Creek grid plots. *Viten*. 1:121-123.

Point quadrat grid



Walker, D.A., Walker, M.D., Gould, W.A., Mercado, J., Auerbach, N.A., Maier, H.A., Neufeld, G.P. 2010. Maps for monitoring changes to vegetation structure and composition: The Toolik and Imnavait Creek grid plots. *Viten*. 1:121-123.

Time-series results from Imnavait Creek point-quadrat data

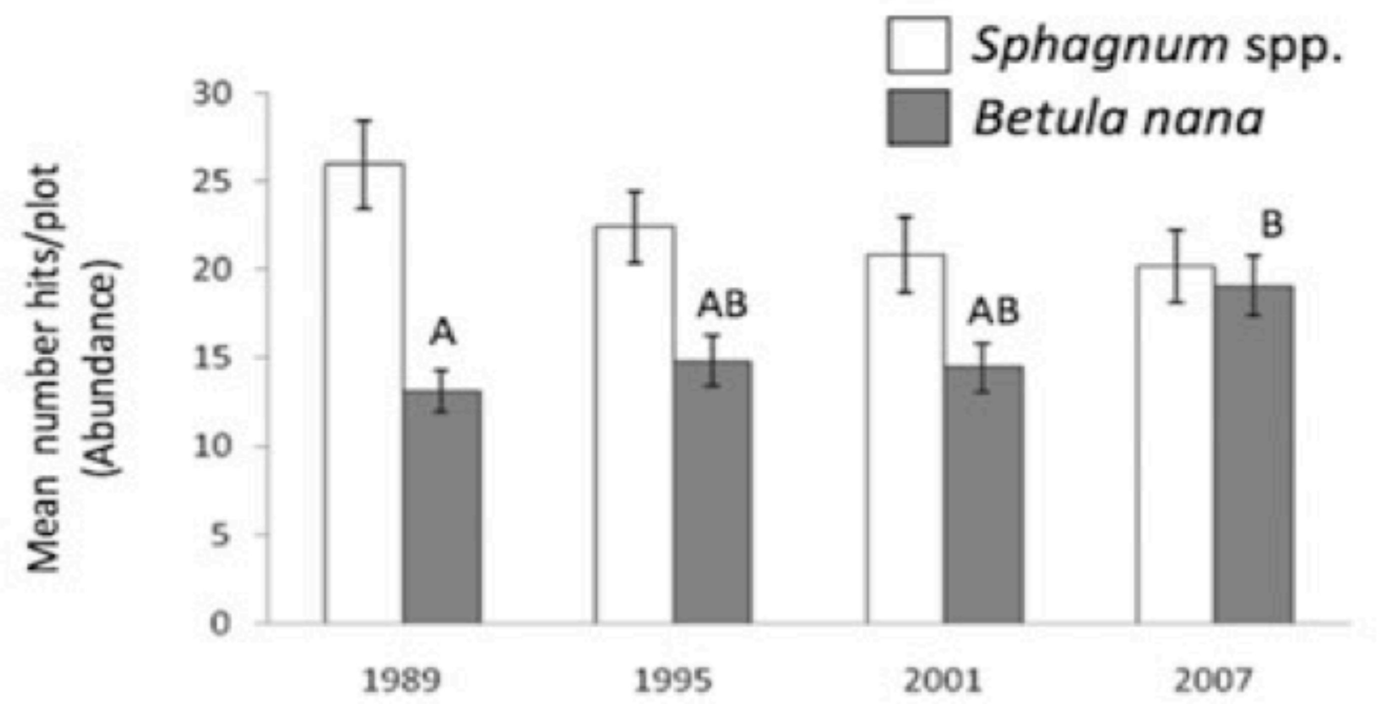


Figure 5: Changes in Betula nana and Sphagnum cover at Imnavait Creek (1989, 1995, 2001, 2007) Changes in the abundances of the deciduous shrub Betula nana and Sphagnum mosses from 1989 to 2007 at the Imnavait Creek Grid, AK. Letters indicate significant differences between years. Error bars are standard errors.

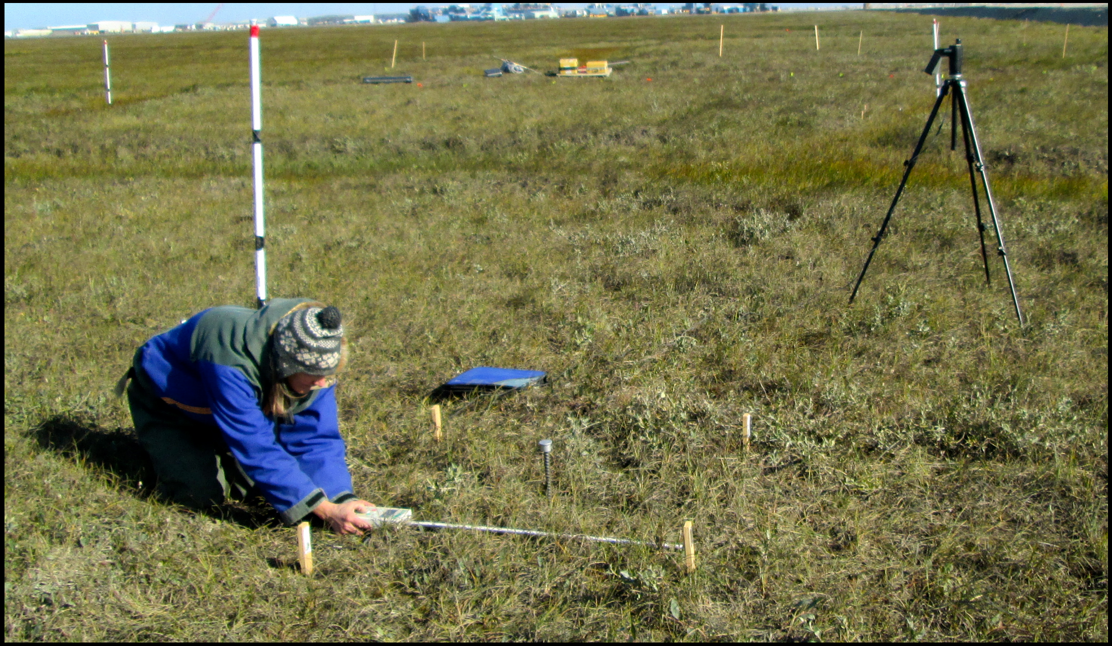
Data from W.G. Gould and J. Mercado.

Biomass clip harvest

Biomass sorting according plant functional types

Leaf Area Index (LAI)

- **Numerous methods again. All other methods, other than actually measuring leaf area, provide an "index" of this value (e.g. inclined point frame, LICOR-2000).**
- **Regression methods are used to relate biomass to leaf area.**

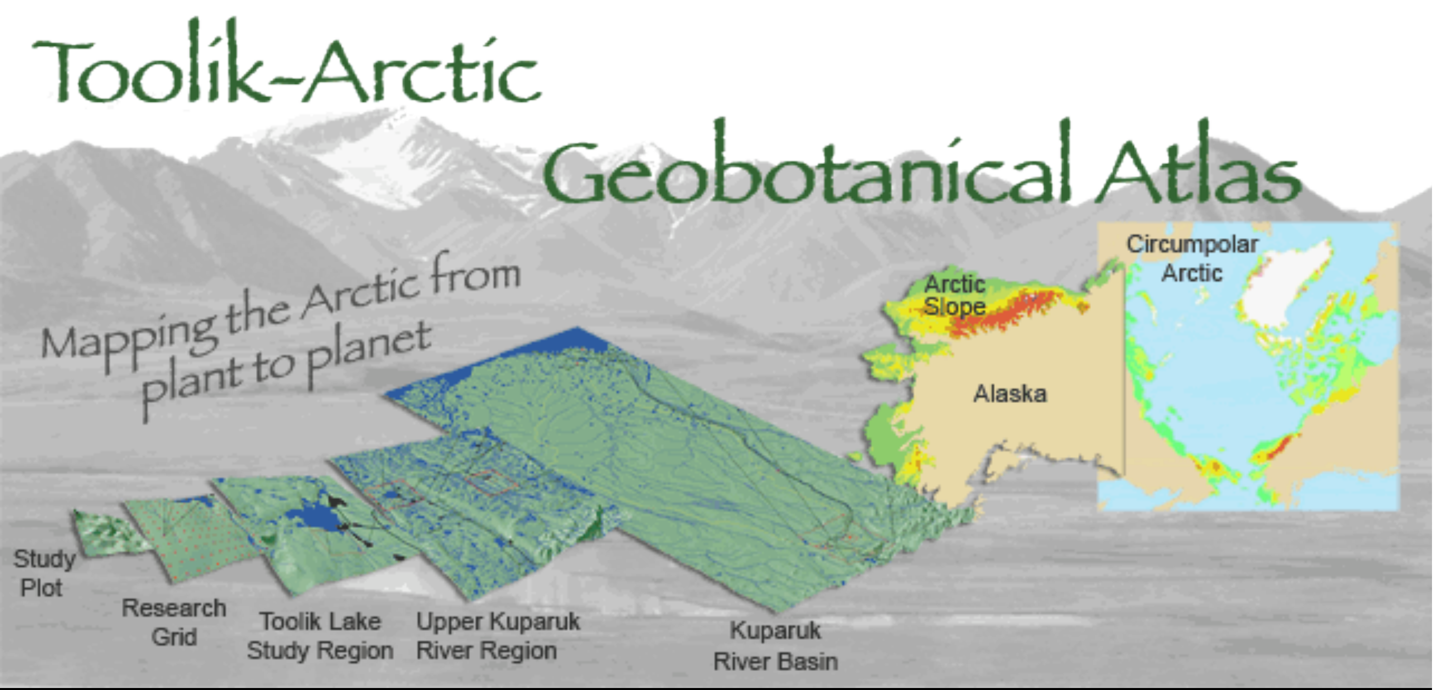


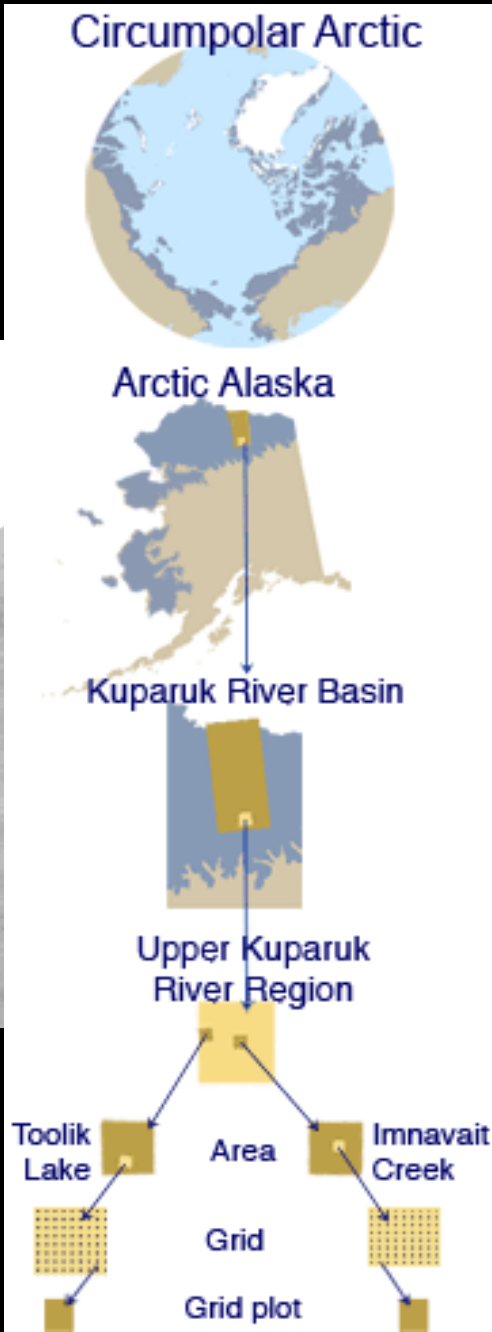
Martha Raynolds using AccuPAR LP-80 to measure LAI.

Normalized Difference Vegetation Index (NDVI)

- **Howie and Martha**

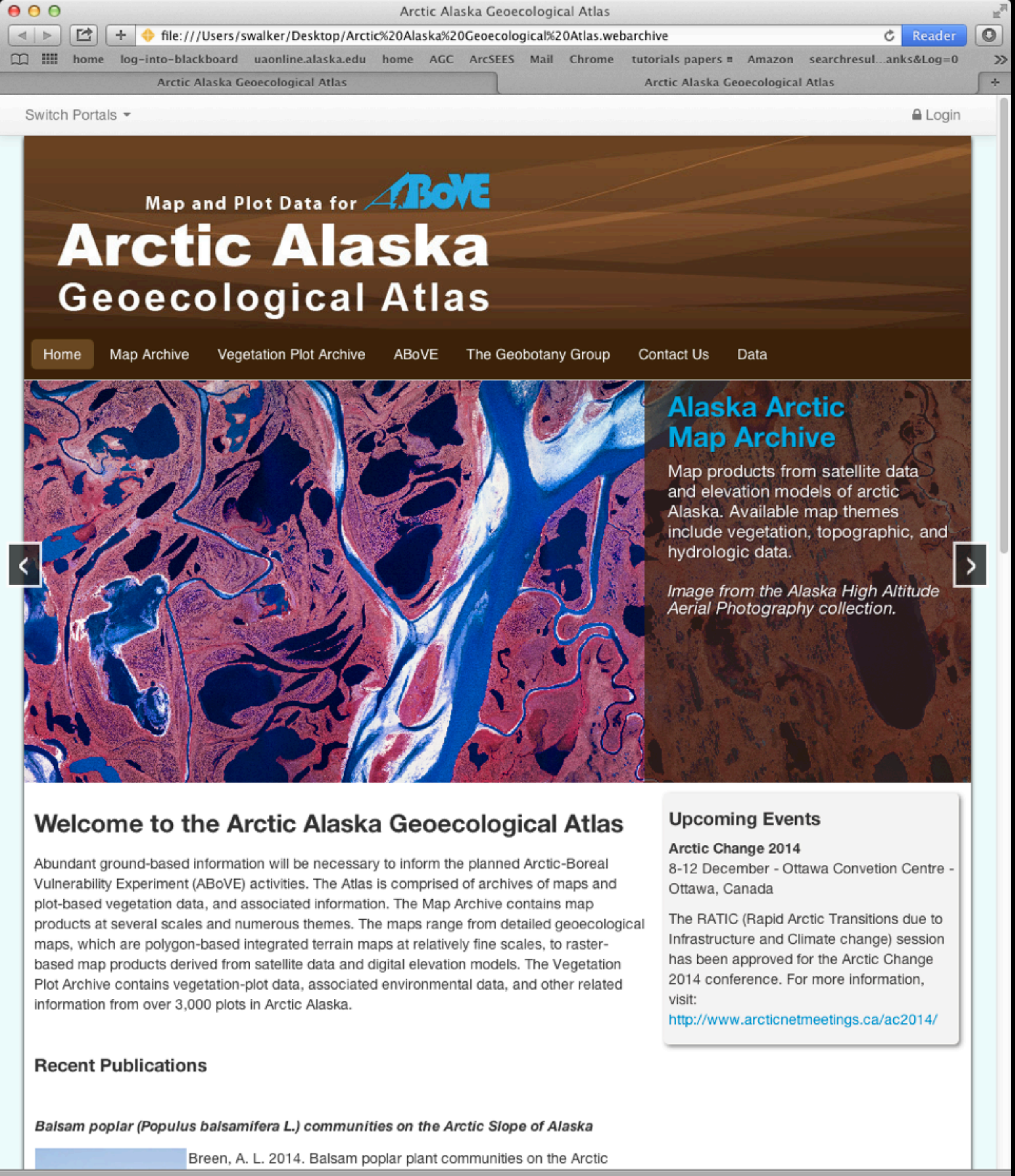
This multi-scale complexity requires a hierarchical mapping approach (e.g., the Toolik-Arctic Geobotanical Atlas, TAGA).





http://www.arcticatlas.org/index

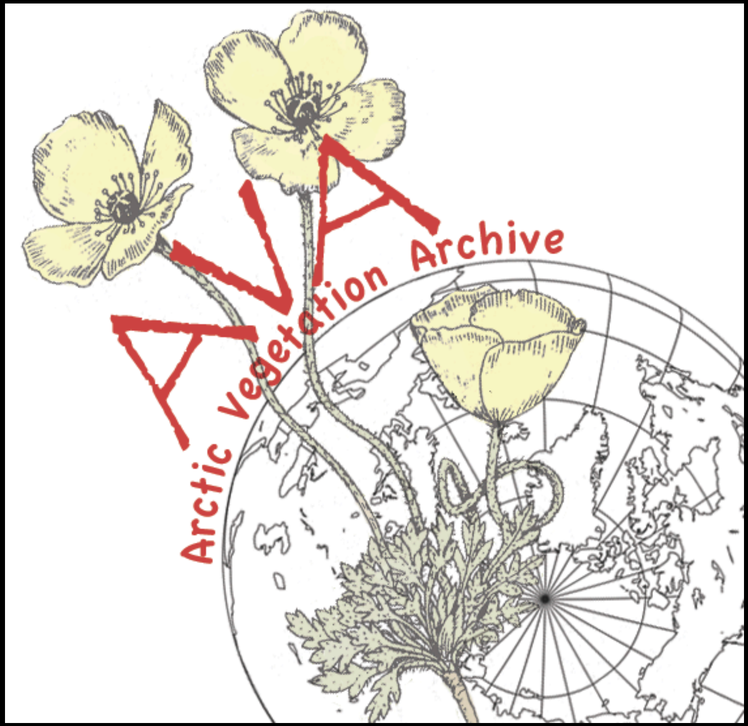
Walker, D. A., M. K. Raynolds, H. A. Maier, E. M. Barbour, and G. P. Neufeld. 2010. Circumpolar geobotanical mapping: A web-based plant-to-planet approach for vegetation-change analysis in the Arctic. Pages 125–128 *in* A. Bryn, W. Dramstad, and W. Fjellstad, editors. Hveragerði, Iceland.



The T-AGA is being transported to the GINA Pre-ABoVE website

Arctic Vegetation Archive

- Conceptual framework for the project
- Prototype for Alaska



Why the Arctic?

- **Floristically and vegetatively the most homogeneous of the global biomes.**
- **Its entire list of known vascular plants, bryophytes and lichens documented in up-to-date checklists.**
- **Already mapped at the global scale (CAVM Team 2003).**

Photo: D.A. Walker, Hayes I., Franz Josef Land, Russia

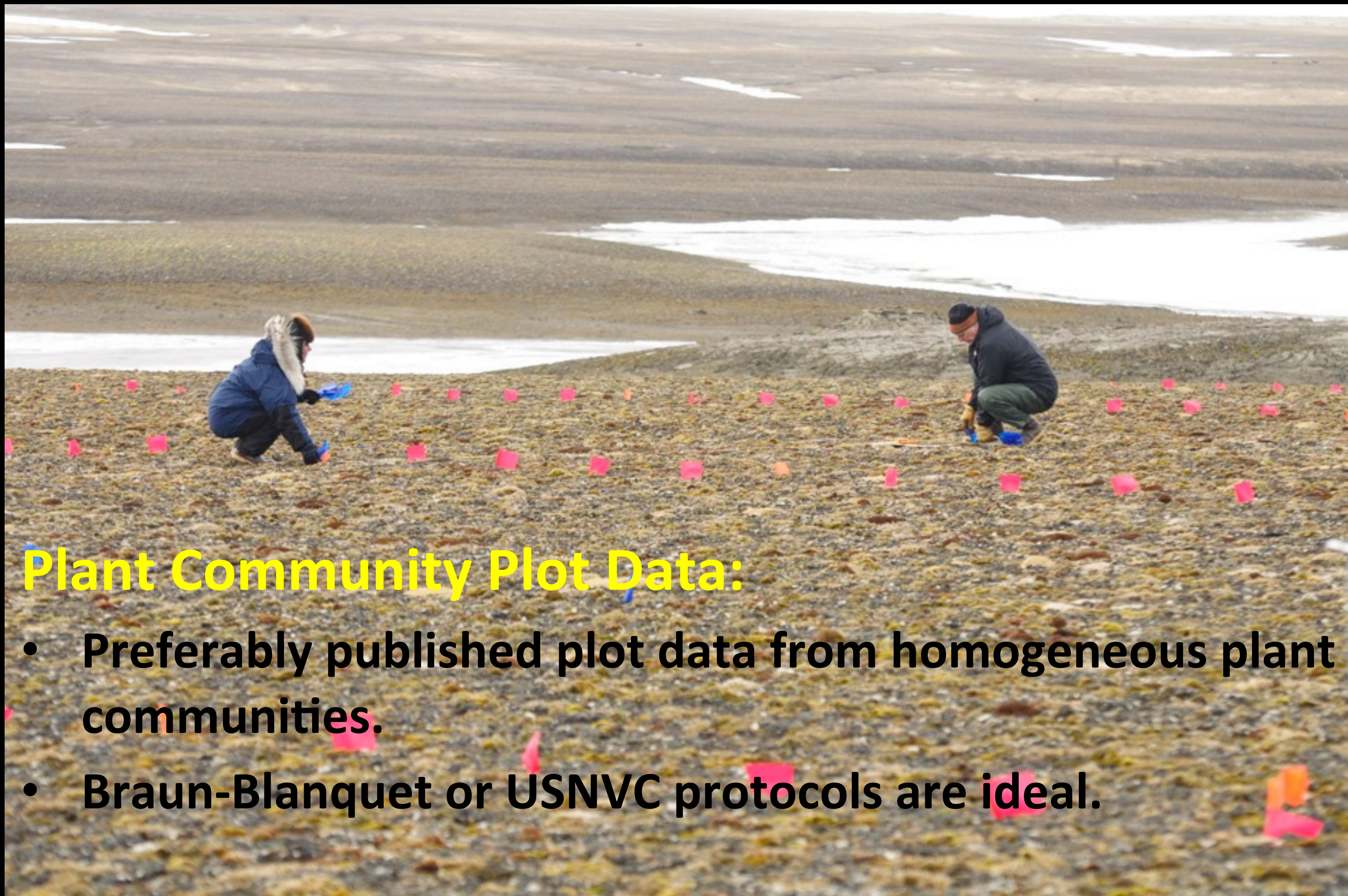
Need for data harmonization

- Much of the world is heavily invested in either the European or North America vegetation approaches (DeCaceras & Wiser 2011).
- The Arctic vegetation database would be constructed so that the data could be incorporated into either approach.

AVA Goals

1. Panarctic vegetation database.
2. Web portal with descriptions, ancillary information, photos, maps of each plant community, plot .
3. Panarctic vegetation classification.
4. Prodromus (list) of Arctic plant communities.
5. Applications to biodiversity, ecosystem modelling, education etc.

Types of data



Plant Community Plot Data:

- **Preferably published plot data from homogeneous plant communities.**
- **Braun-Blanquet or USNVC protocols are ideal.**

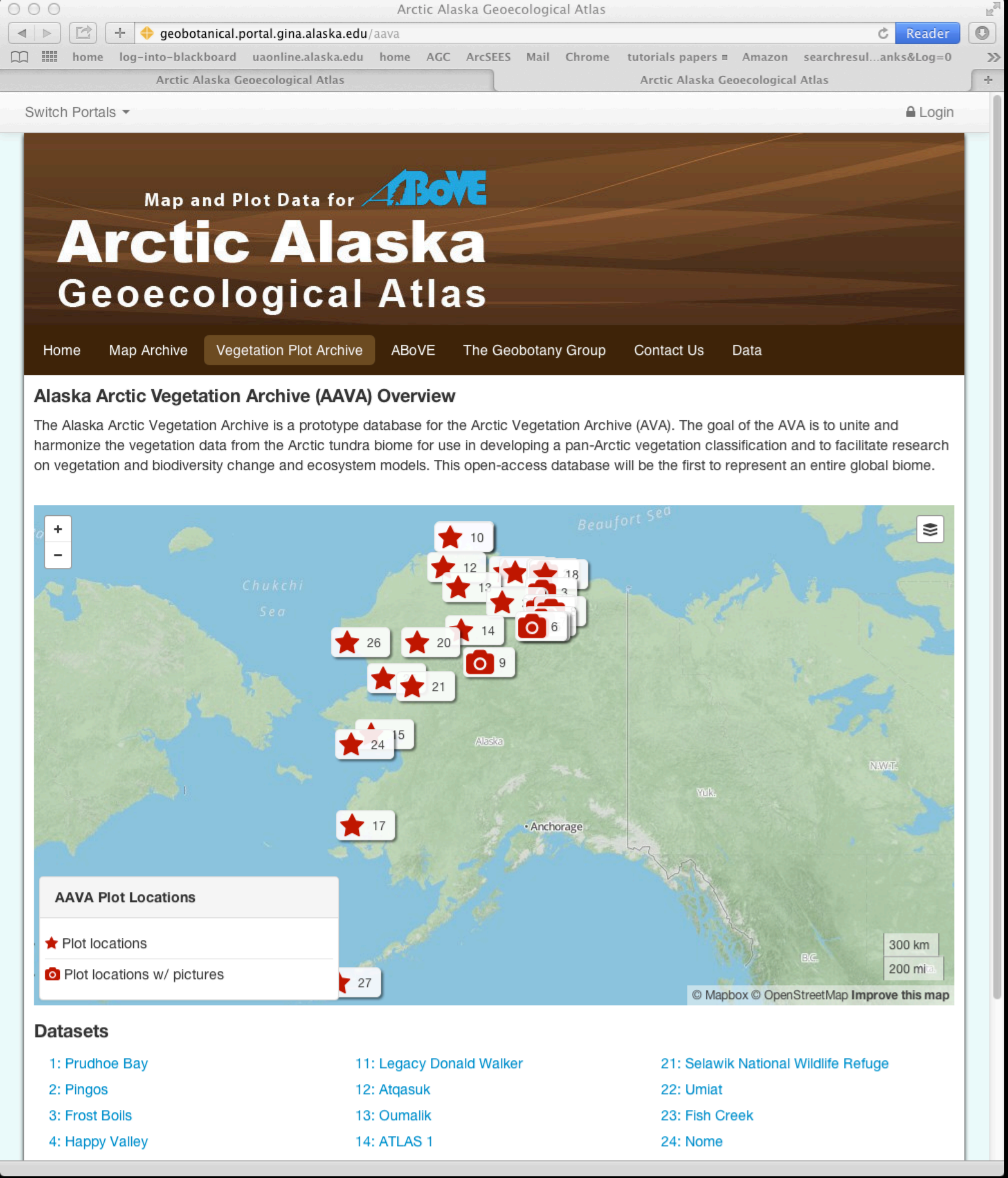
Photo: G. Matyshak , Hayes Island, Franz Josef Land, Russia

Panarctic Species List (PASL) of accepted names: a critical first piece

- ***Combines several CAFF Arctic species lists into one that is foundation for the AVA (Raynolds et al. Krakow workshop):***

Photo: D.A. Walker

GINA
Plot portal


Arctic Alaska Geoecological Atlas

geobotanical.portal.gina.alaska.edu/aava

Switch Portals | Login

Map and Plot Data for ABoVE

Arctic Alaska Geoecological Atlas

Home | Map Archive | Vegetation Plot Archive | ABoVE | The Geobotany Group | Contact Us | Data

Alaska Arctic Vegetation Archive (AAVA) Overview

The Alaska Arctic Vegetation Archive is a prototype database for the Arctic Vegetation Archive (AVA). The goal of the AVA is to unite and harmonize the vegetation data from the Arctic tundra biome for use in developing a pan-Arctic vegetation classification and to facilitate research on vegetation and biodiversity change and ecosystem models. This open-access database will be the first to represent an entire global biome.

Datasets

1: Prudhoe Bay
2: Pingos
3: Frost Boils
4: Happy Valley
11: Legacy Donald Walker
12: Atqasuk
13: Oumalik
14: ATLAS 1
21: Selawik National Wildlife Refuge
22: Umiat
23: Fish Creek
24: Nome

Key documents

Walker, D. A., and M. K. Raynolds. 2011. An International Arctic Vegetation Database: A foundation for panarctic biodiversity studies. CAFF Strategy Series Report nr. 5. Conservation of Arctic Flora and Fauna (CAFF), Akureyri, Iceland.

Walker, D. A., I. G. Alsos, C. Bay, N. Boulanger-Lapointe, A. L. Breen, H. Bültmann, T. Christiansen, C. Damgaard, F. J. A. Daniels, S. M. Hennekens, P. C. Le Roux, M. Luoto, L. Pellisier, R. K. Peet, N. M. Schmidt, L. Stewart, N. G. Yoccoz, and M. S. Wisz. 2013. Rescuing valuable Arctic vegetation data for biodiversity models, ecosystem models and a panarctic vegetation classification. Arctic:133–137.

Walker, D. A., A. L. Breen, M. K. Raynolds, and M. D. Walker (Eds.). 2013. Arctic Vegetation Archive Workshop, Krakow, Poland April 14-16, 2013. Pages 1-111. CAFF Proceedings Report #10,

Walker, D. A. (Ed.). 2014. Alaska Arctic Vegetation Archive (AVA) Workshop, Boulder,Colorado, USA, October 14-16, 2013, CAFF Proceedings Report 11. Pages 1–89. CAFF Proceedings Series Report No. 11, Akureyri, Iceland.

Walker, D. A. 2014. Toward a pan-Arctic vegetation archive and classification: Two recent workshops. IAVS Bulletin 2014/1:12–16.

Thank you!

Photo: D.A. Walker. Franz Josef Land