

Plant cover and the relationship with soil properties in Atqasuk, Alaska

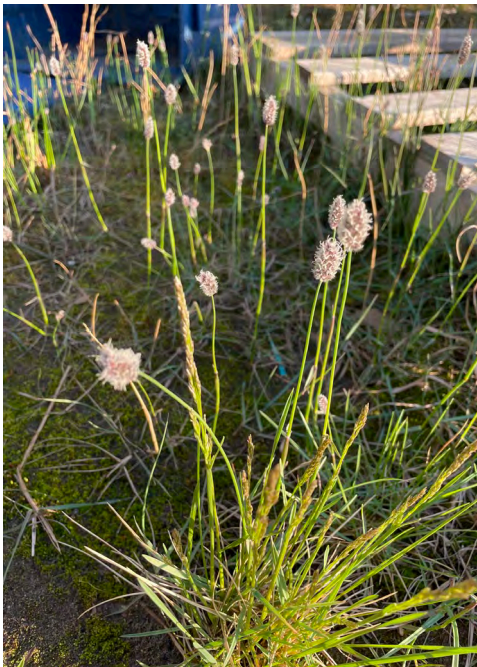
Taylor Doorn



A Changing Arctic

- Air temperature and precipitation increase
- Arctic shrubification
- Increased annual permafrost thawing





Poaceae



Ericaceae



Cyperaceae



Salicaceae



Sphagnum Moss

A Changing Arctic

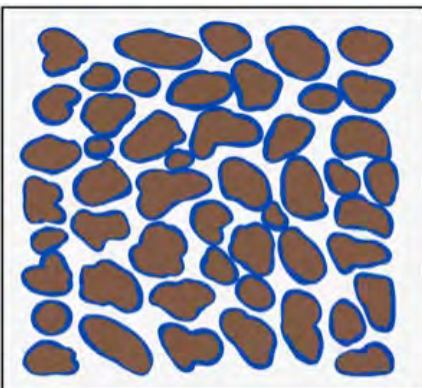
Soil Moisture

Soil Temperature

Thaw Depth

Soil pH

Organic Matter



Atqasuk, Alaska

- Small indigenous city in the North Slope founded in 1982
- 60 miles south of Utqiagvik
- Formerly known as “Meade River”



Atqasuk, Alaska

Dry Heath



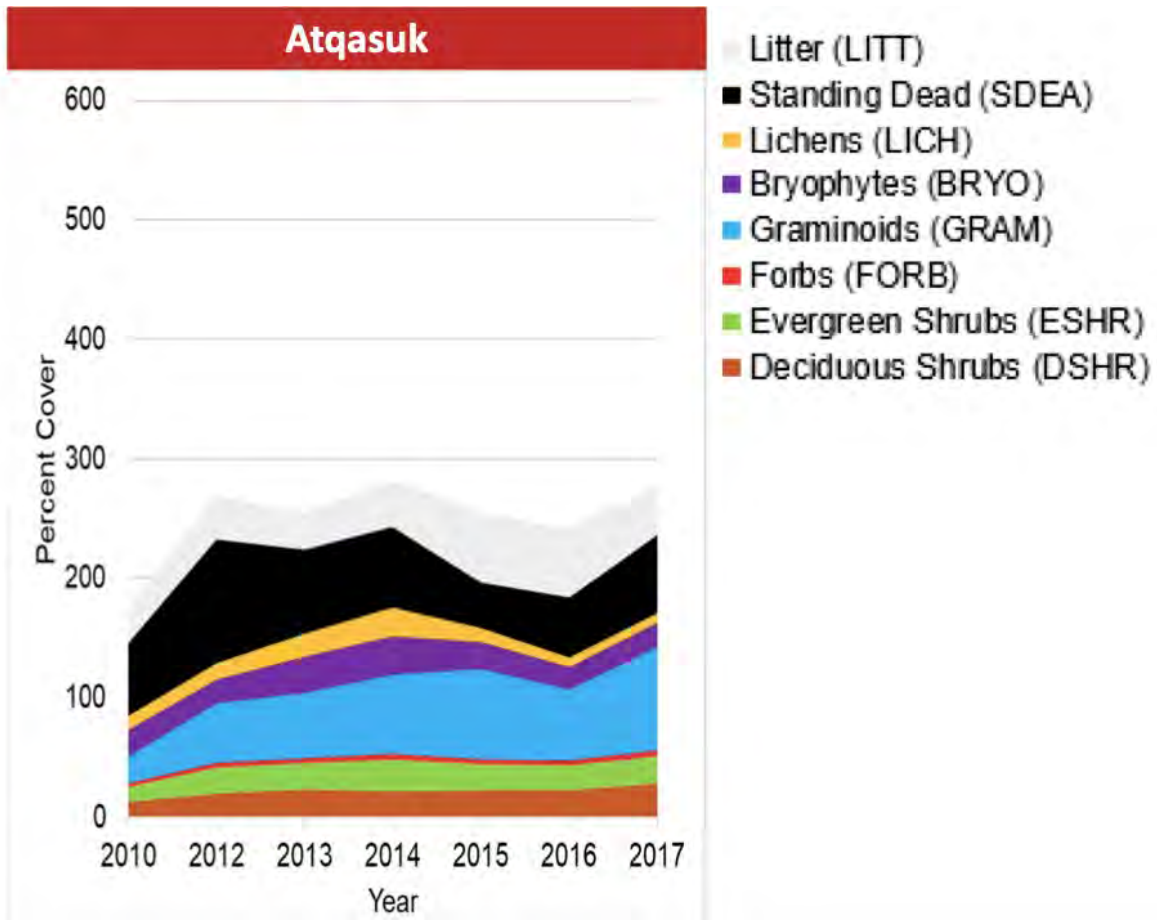
Wet Meadow

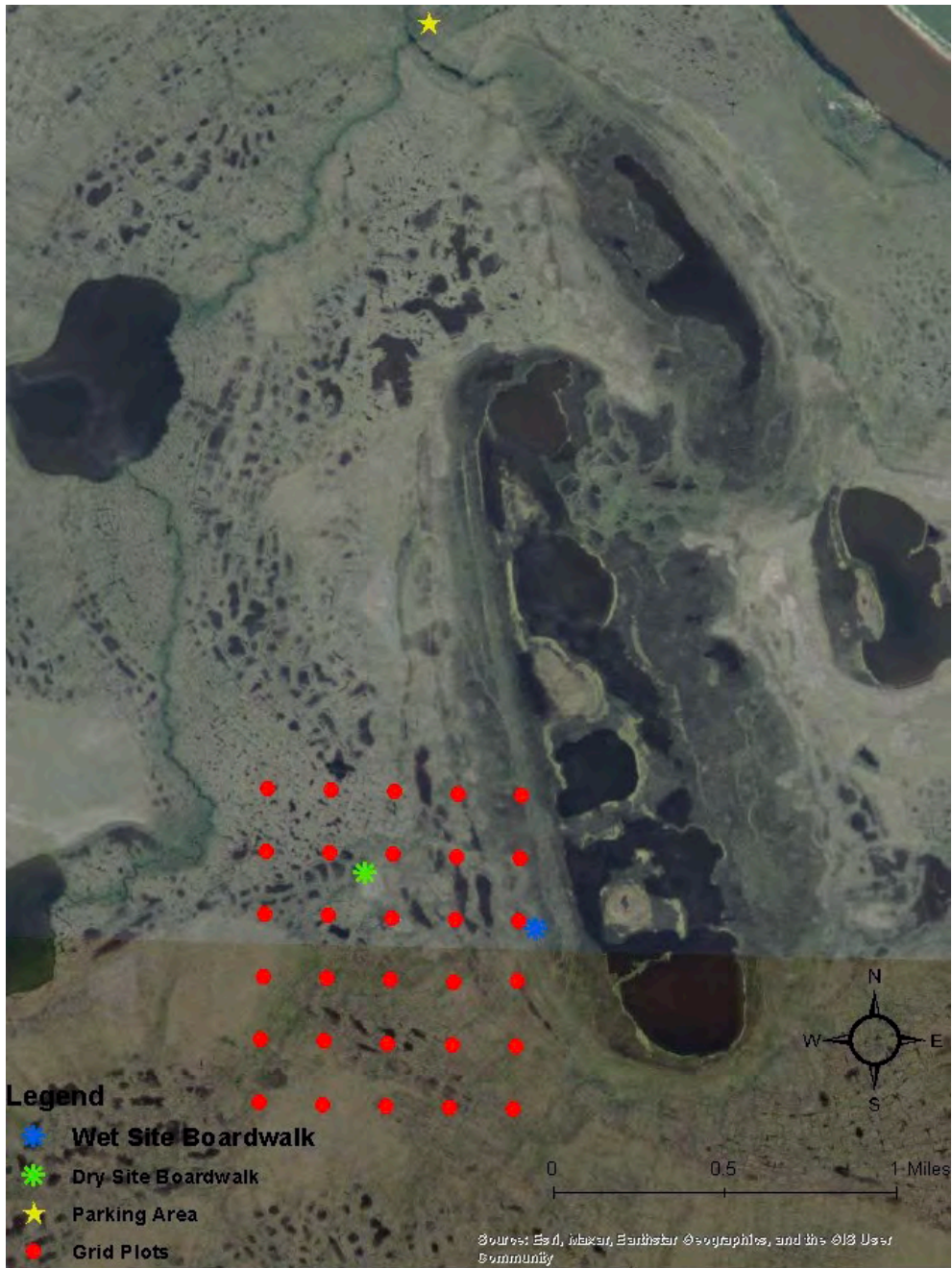


Moist Acidic



Atqasuk, Alaska



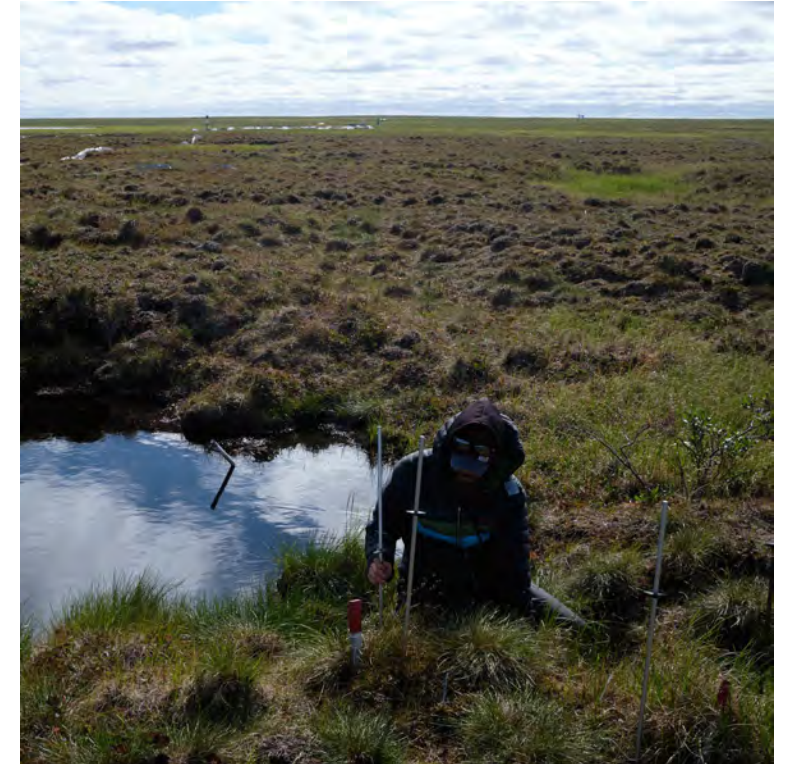
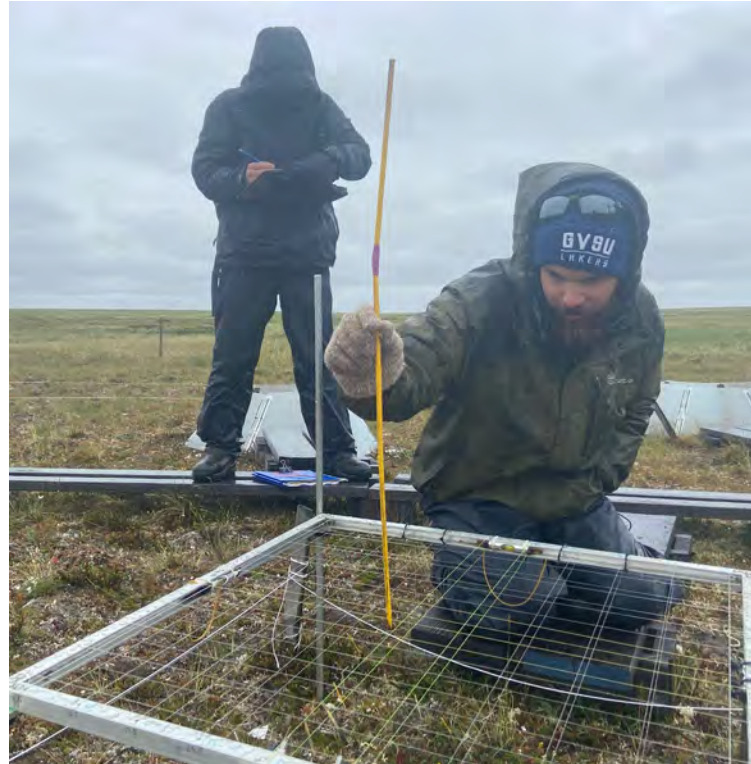


Study Site

- ARCSS grid established in 1995
- 30 plots sampled out of 100
- Five wet and dry sites established in 1998

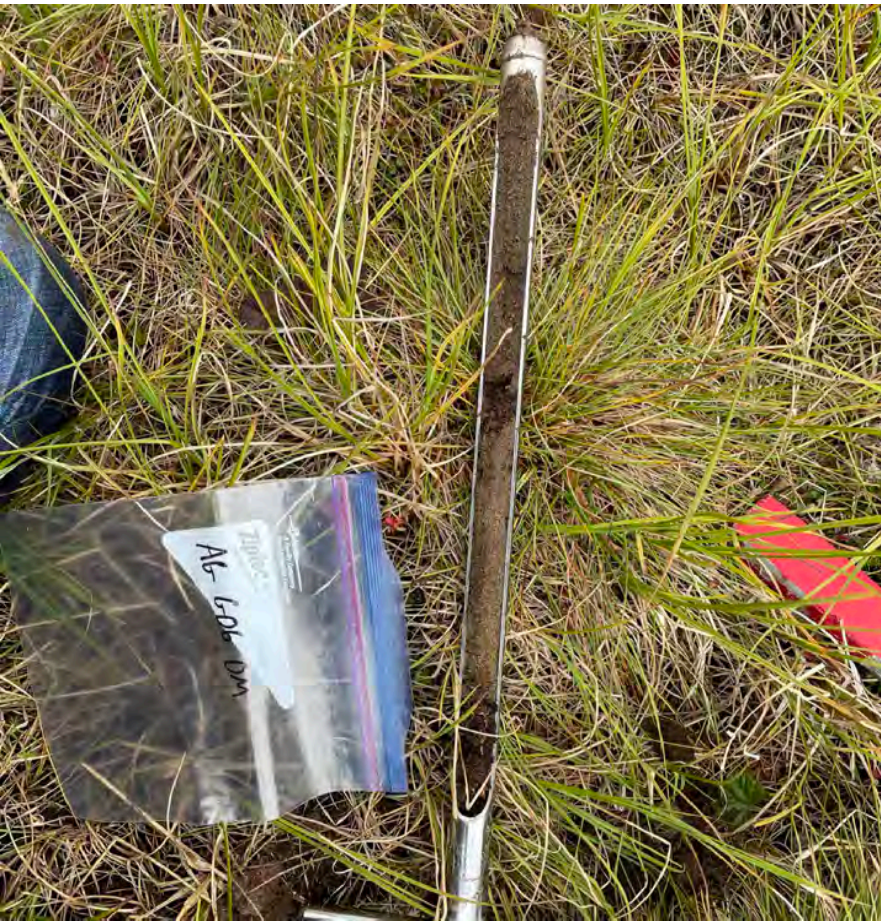
Cover Sampling

- Utilize point frame method to get cover data



Soil Sampling

- Soil collection using soil core
- Soil moisture meter
- Thaw depth



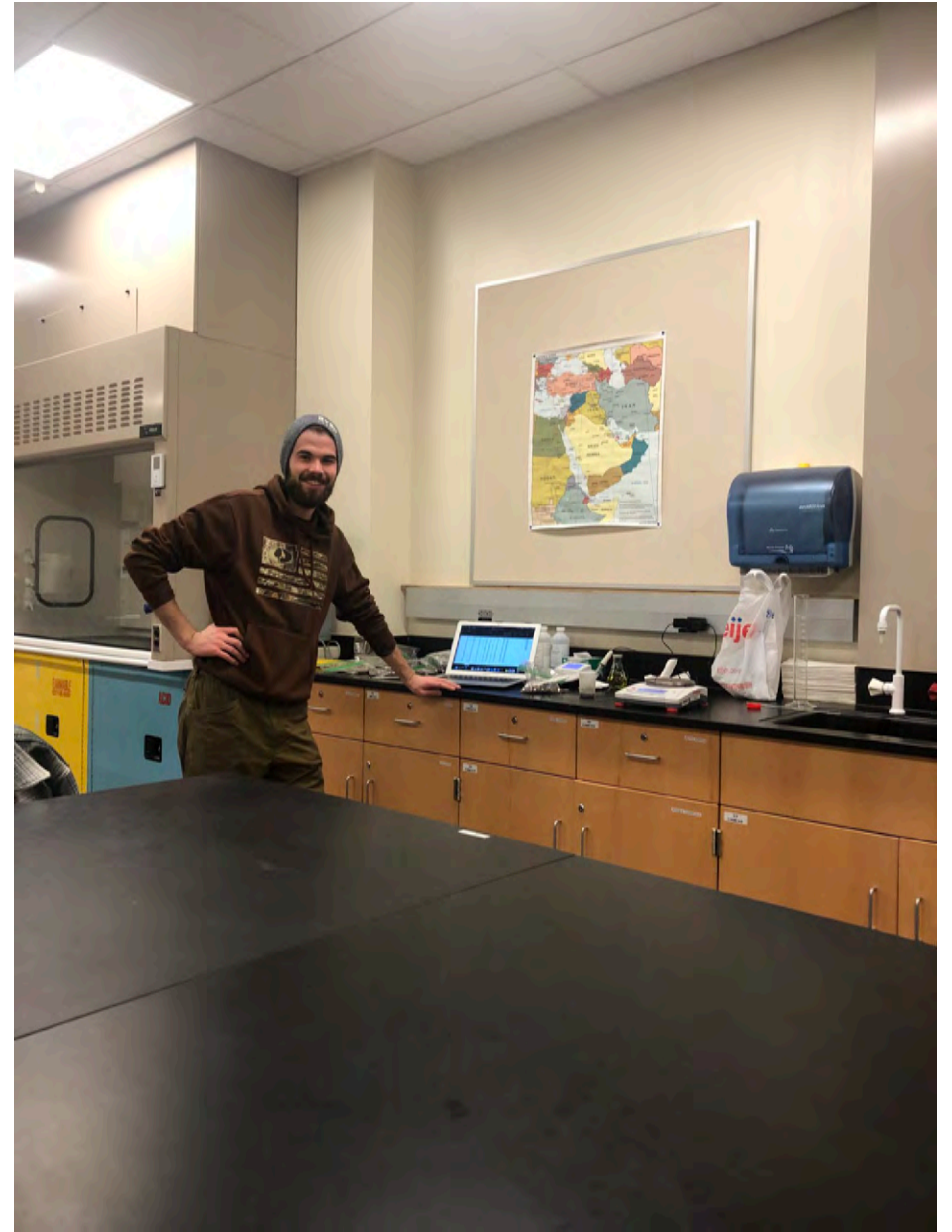
Soil Sampling

- Samples were frozen and shipped to Michigan
- pH tested in the lab
- Soil samples burned in muffle furnace at 400 degrees celsius
- Soils burned for 16 hours



Statistics

- Pearson's correlation between plant families % cover and soil properties



The Results

- Ericaceae (evergreen shrubs)

Family Cover	pH	Organic Matter	Soil Moisture	Soil Temperature	Thaw Depth
Ericaceae	0.000	0.052	-0.104	0.058	0.012
Poaceae	0.007	0.003	-0.442	-0.386	0.242
Cyperaceae	0.002	0.057	0.053	0.040	0.030
Salicaceae	0.035	0.096	-0.580	0.020	0.043
Sphagnum	-0.346	0.000	0.000	-0.101	0.052

Adjusted R² values showing correlations between each plant family and each soil property

The Results

- Poaceae (grasses)

Family Cover	pH	Organic Matter	Soil Moisture	Soil Temperature	Thaw Depth
Ericaceae	0.000	0.052	-0.104	0.058	0.012
Poaceae	0.007	0.003	-0.442	-0.386	0.242
Cyperaceae	0.002	0.057	0.053	0.040	0.030
Salicaceae	0.035	0.096	-0.580	0.020	0.043
Sphagnum	-0.346	0.000	0.000	-0.101	0.052

Adjusted R² values showing correlations between each plant family and each soil property

The Results

- Cyperaceae (sedges)

Family Cover	pH	Organic Matter	Soil Moisture	Soil Temperature	Thaw Depth
Ericaceae	0.000	0.052	-0.104	0.058	0.012
Poaceae	0.007	0.003	-0.442	-0.386	0.242
Cyperaceae	0.002	0.057	0.053	0.040	0.030
Salicaceae	0.035	0.096	-0.580	0.020	0.043
Sphagnum	-0.346	0.000	0.000	-0.101	0.052

Adjusted R² values showing correlations between each plant family and each soil property

The Results

- Salicaceae (deciduous shrubs)

Family Cover	pH	Organic Matter	Soil Moisture	Soil Temperature	Thaw Depth
Ericaceae	0.000	0.052	-0.104	0.058	0.012
Poaceae	0.007	0.003	-0.442	-0.386	0.242
Cyperaceae	0.002	0.057	0.053	0.040	0.030
Salicaceae	0.035	0.096	-0.580	0.020	0.043
Sphagnum	-0.346	0.000	0.000	-0.101	0.052

Adjusted R² values showing correlations between each plant family and each soil property

The Results

- Sphagnum Moss

Family Cover	pH	Organic Matter	Soil Moisture	Soil Temperature	Thaw Depth
Ericaceae	0.000	0.052	-0.104	0.058	0.012
Poaceae	0.007	0.003	-0.442	-0.386	0.242
Cyperaceae	0.002	0.057	0.053	0.040	0.030
Salicaceae	0.035	0.096	-0.580	0.020	0.043
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Adjusted R² values showing correlations between each plant family and each soil property

The Meaning

- Deciduous and evergreen shrub cover less common in saturated soils.
- Grasses common in drier soils



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- Sedges may have a higher range of tolerance
- Sphagnum moss associates with lower soil temperature and acidic soils



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In conclusion

- The purpose of this research is to understand the relationship between plant cover within families and soil properties in Atqasuk, Alaska
- Point framing techniques were used to acquire plant cover data, while soil samples were measured in the field and in the lab to calculate soil properties
- These relationships are intended to help understand the dynamics of vegetation change occurring in the Arctic