

Eighteen years of ecological monitoring reveals multiple lines of evidence for tundra vegetation change

Isla Myers-Smith, Meagan Grabowski, Haydn Thomas, Sandra Angers-Blondin, **Gergana Daskalova**, Anne Bjorkman, Andrew Cunliffe, Jakob Assmann, Joseph Boyle, Edward McLeod, Samuel McLeod, Ricky Joe, Paden Lennie, Deon Arey, Richard Gordon and Cameron Eckert

 @gndaskalova

 @TeamShrub



 @gndaskalova

 gndaskalova@gmail.com

 gndaskalova.com

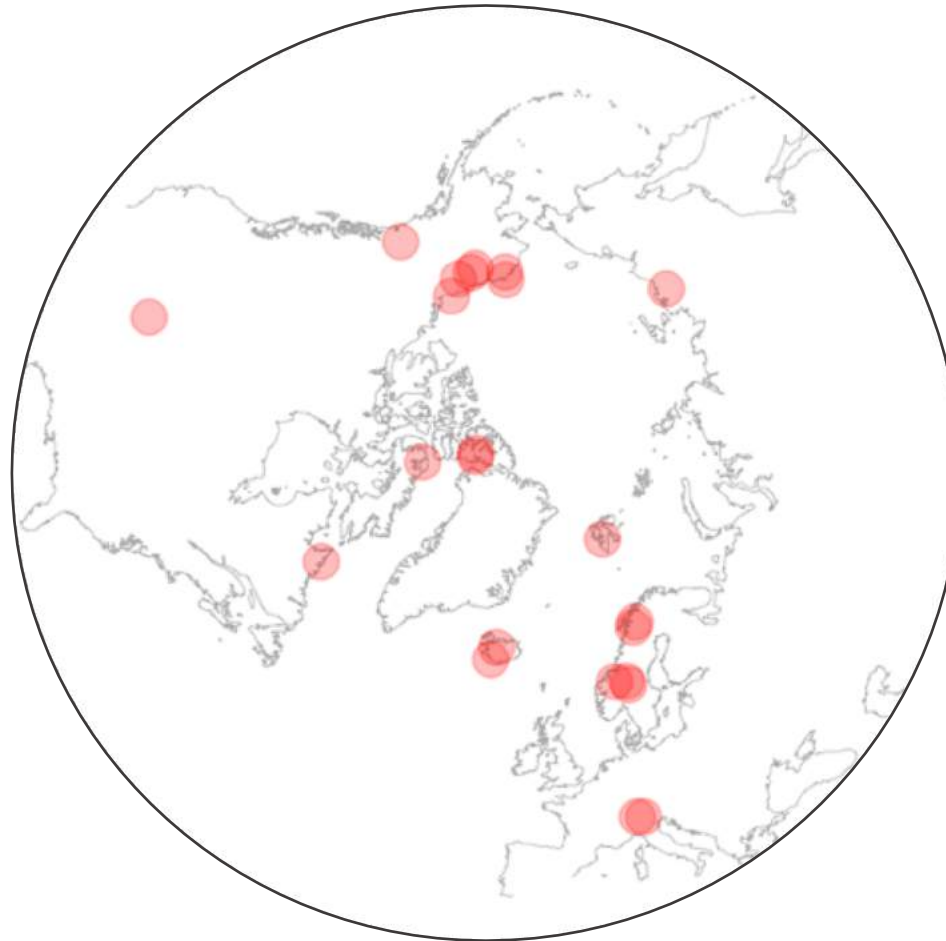
 teamshrub.com



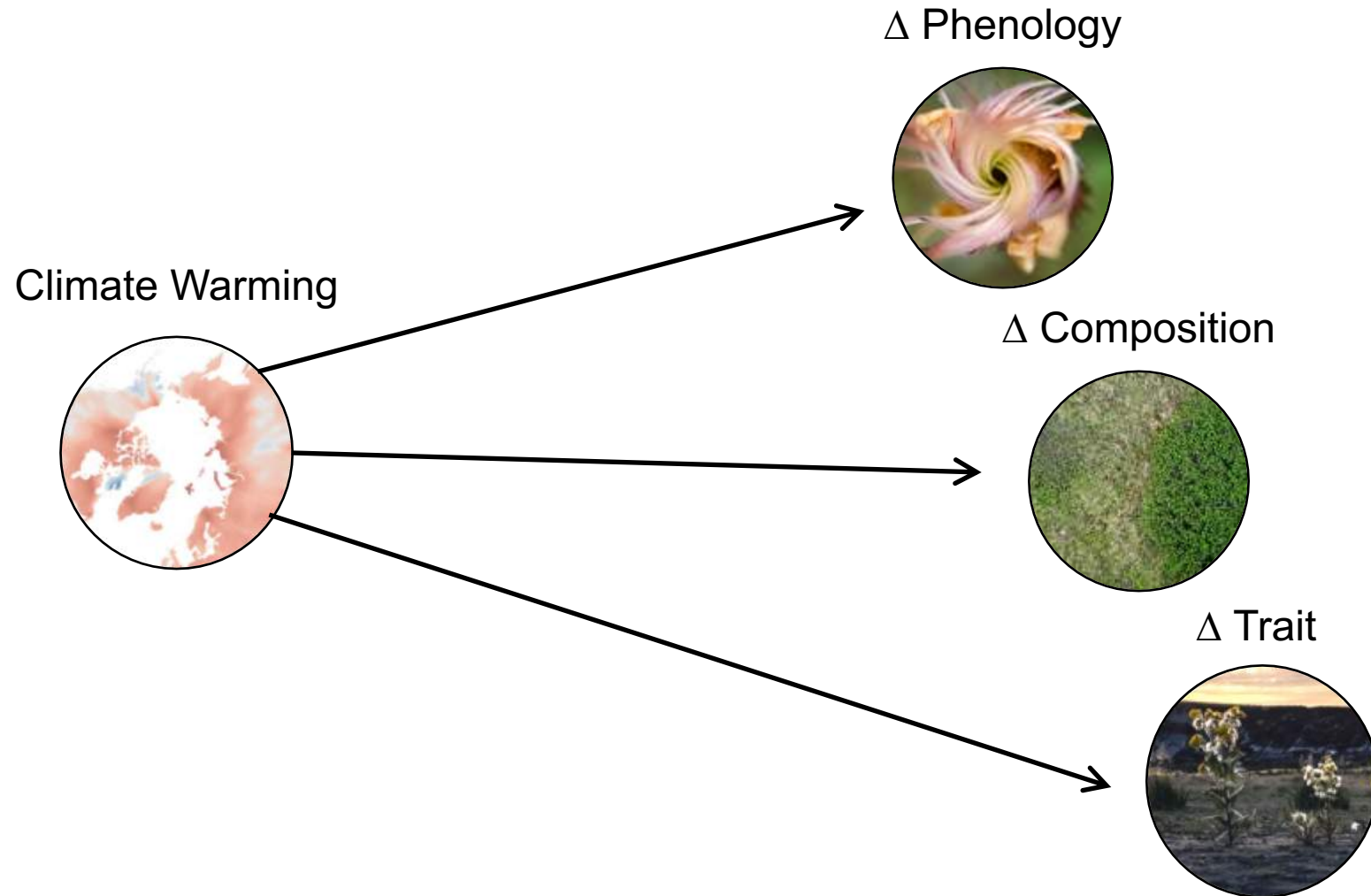
Research questions

- ❓ How are tundra ecosystems changing?
- ❓ What are the drivers of tundra change?

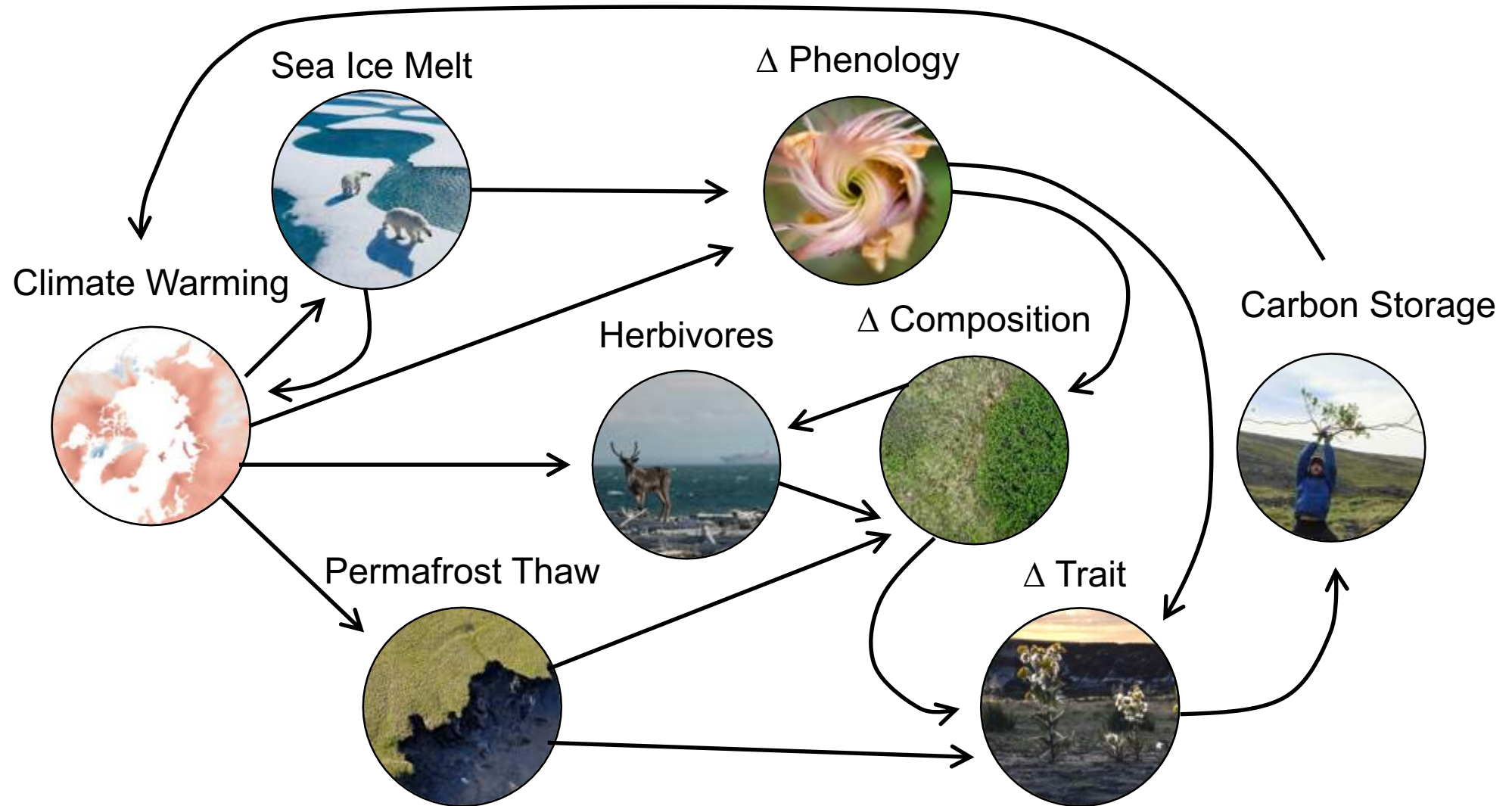
ITEX plant cover sites:



Simplicity: attribution of vegetation change to climate



Complexity: direct versus indirect mechanisms





What is special about Qikiqtaruk-Herschel Island?

1999



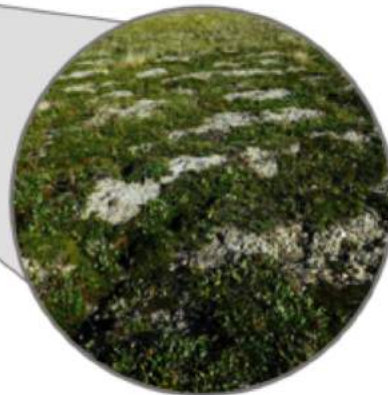
Qikiqtaruk-Herschel Island
Territorial Park



Herschel type



Komakuk type



Sandra Angers-Blondin



Indicators of change



SHRUB COVER



COMMUNITY
COMPOSITION



PHENOLOGY

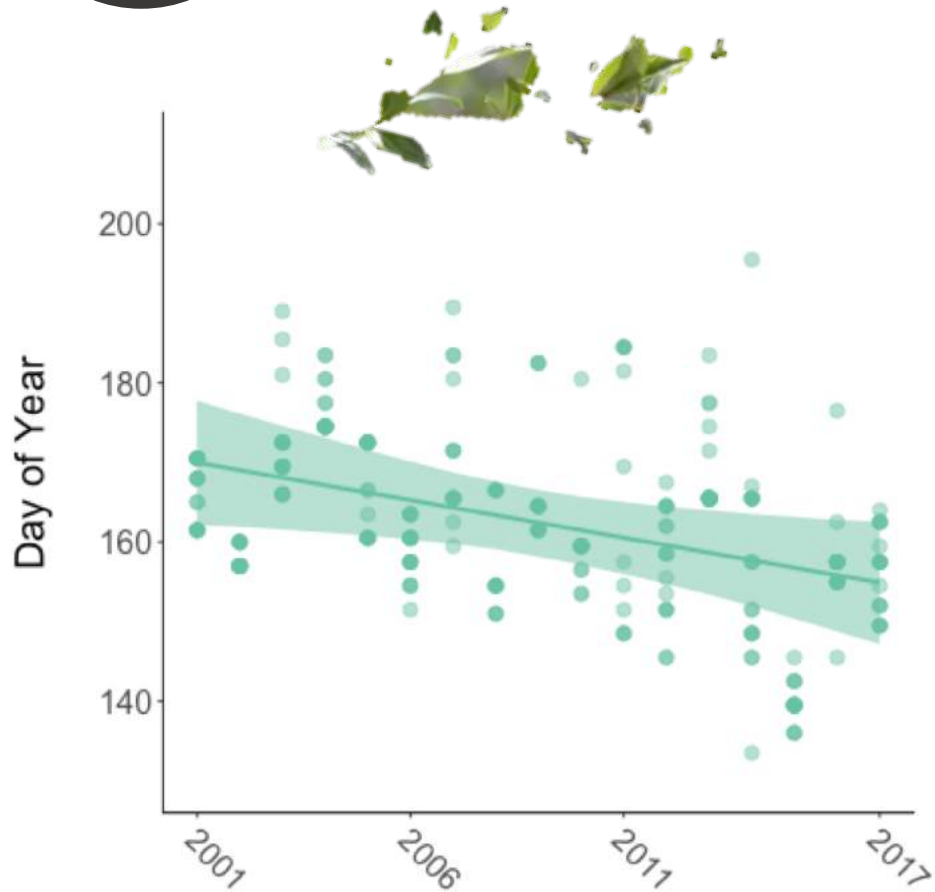


ACTIVE LAYER DEPTH

Elmendorf *et al.* 2012, Myers-Smith *et al.* 2015,
Post *et al.* 2009, Burn and Zhang 2009



What have we found out so far?



Nine day per decade advance
of *Salix arctica* leaf out

1987

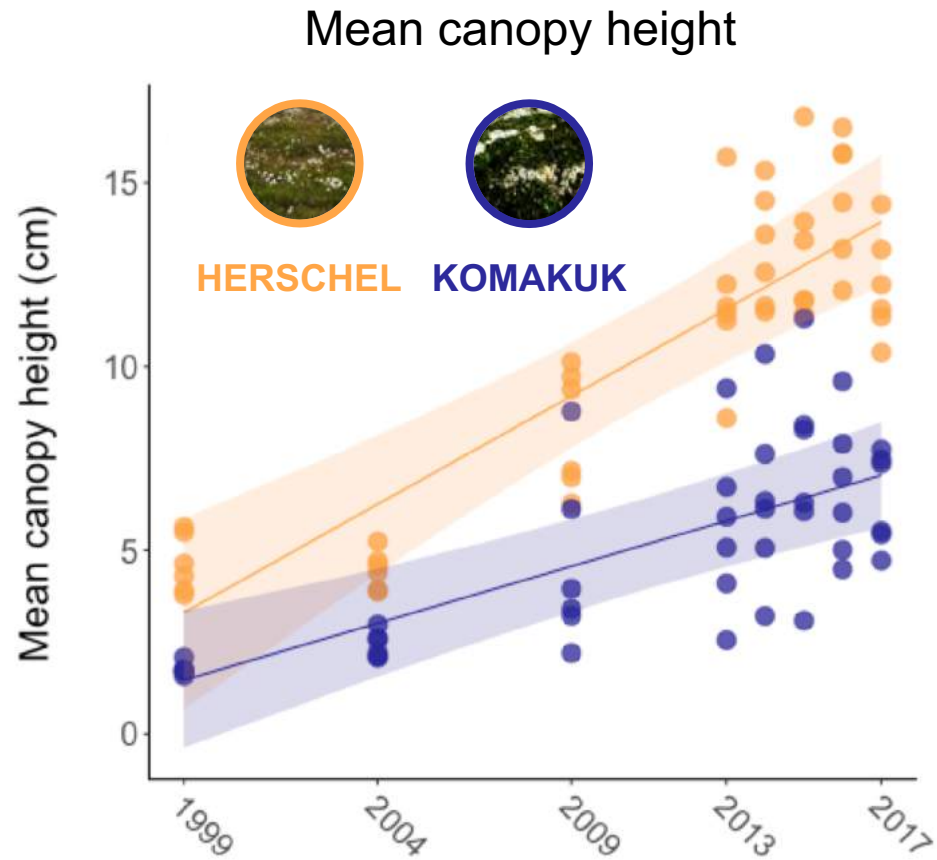


2017





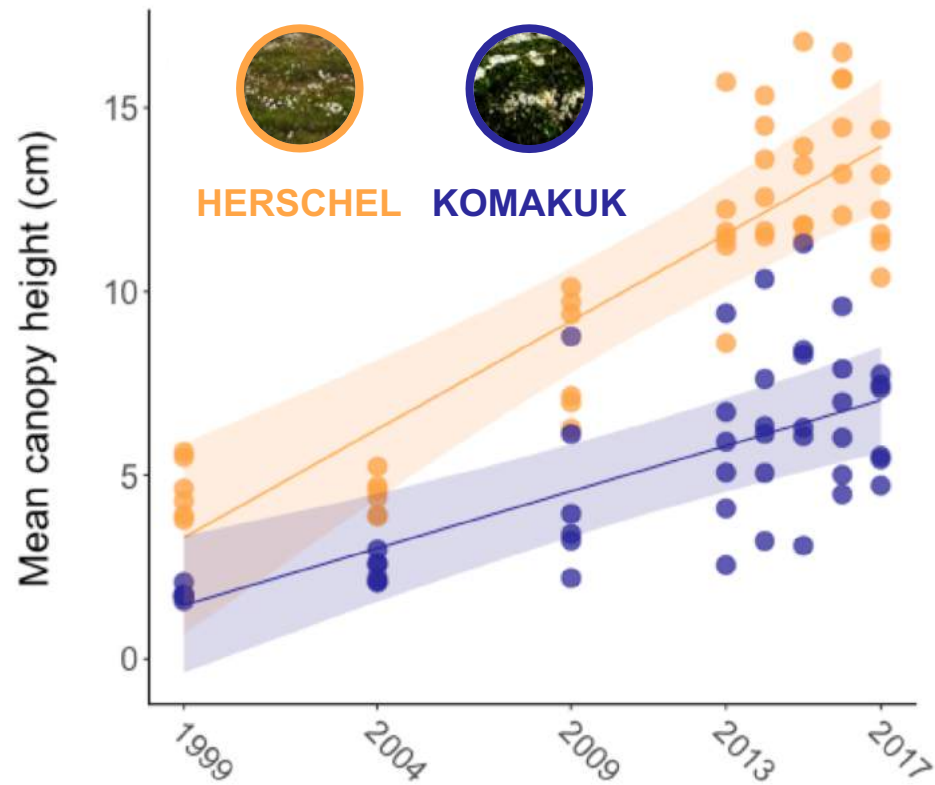
What have we found out so far?



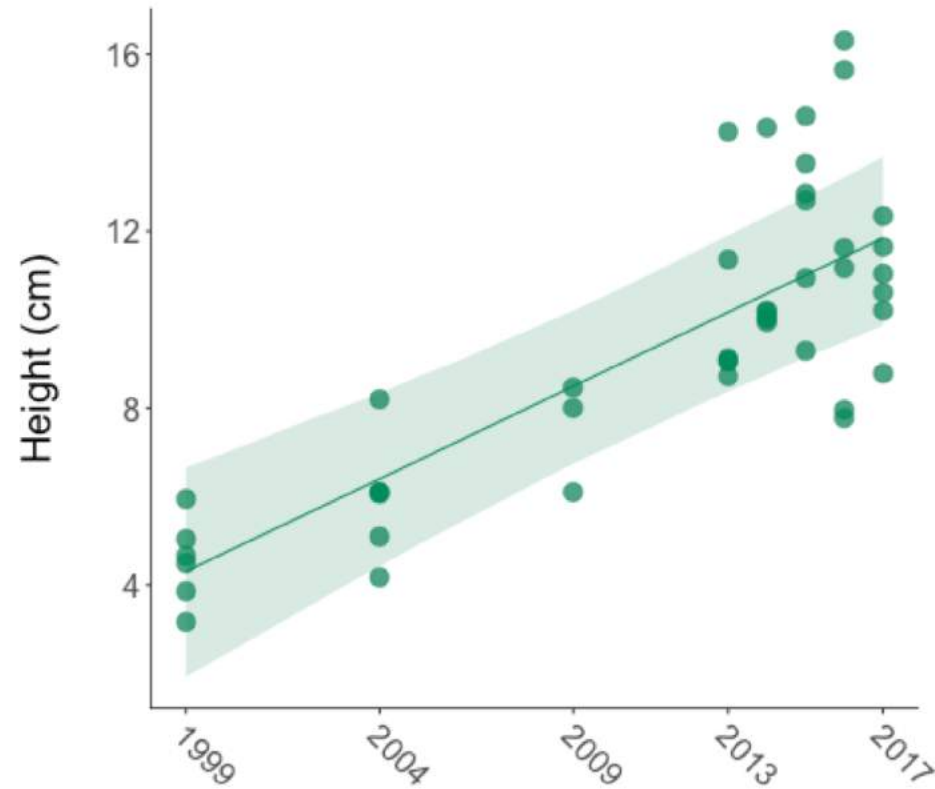


What have we found out so far?

Mean canopy height



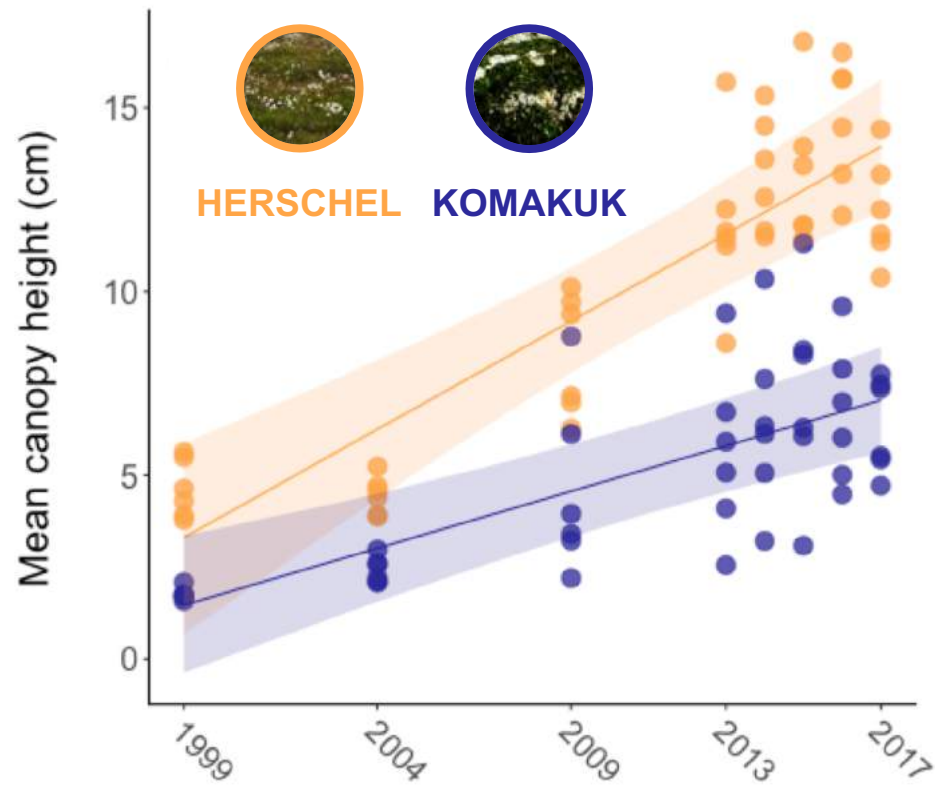
Salix pulchra canopy height



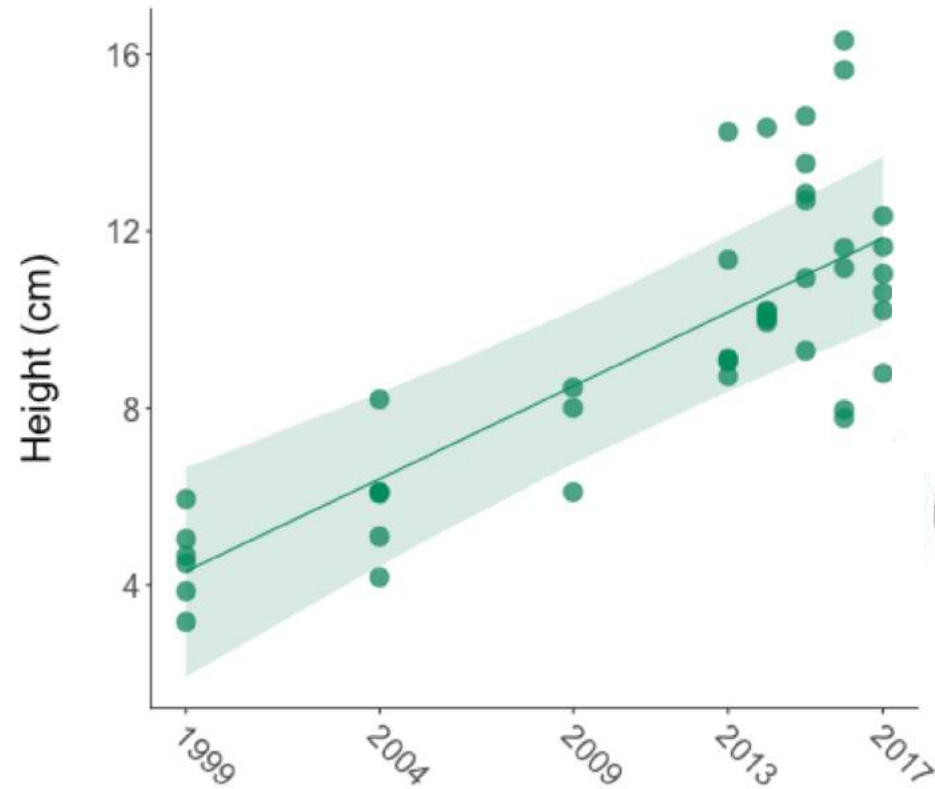


What have we found out so far?

Mean canopy height



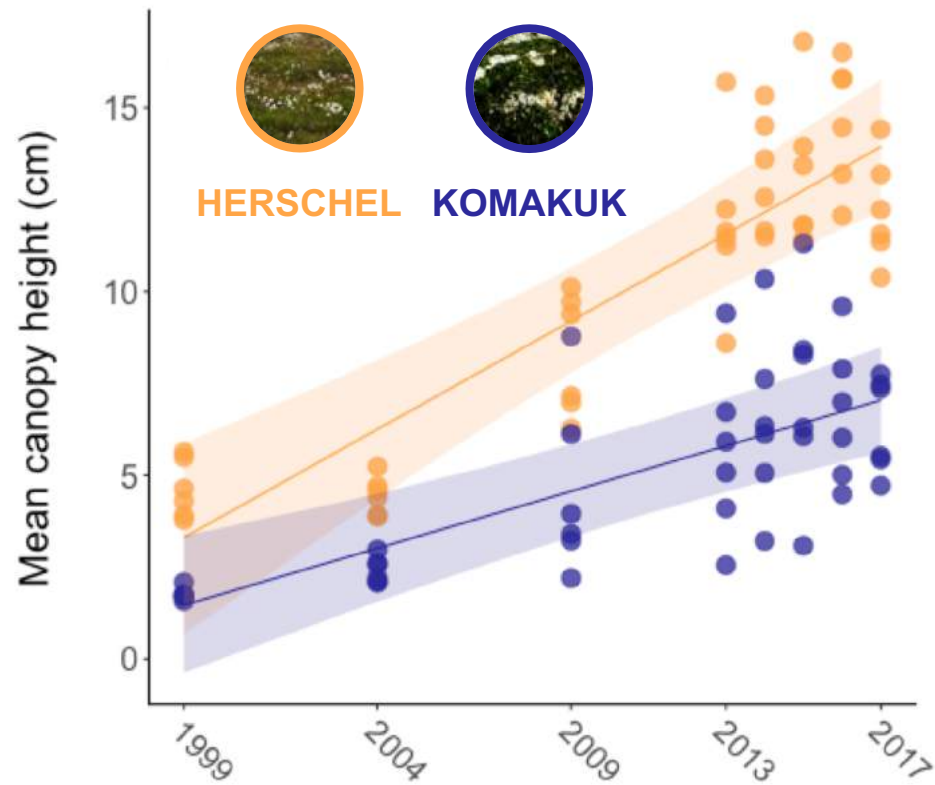
Salix pulchra canopy height



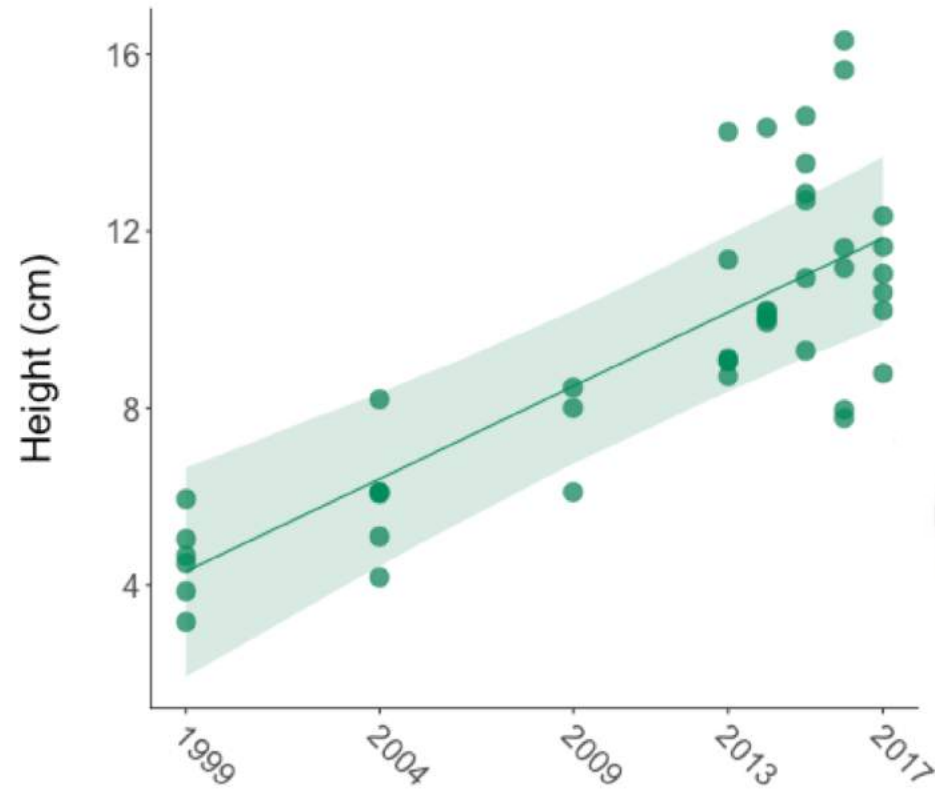


What have we found out so far?

Mean canopy height



Salix pulchra canopy height





What have we found out so far?

MONITORING

Local collaboration



ITEX protocols



VEGETATION CHANGE

Phenology
advances



Increase in
canopy height



Shifts in community composition



ATTRIBUTION

Growing season length



Active layer deepening





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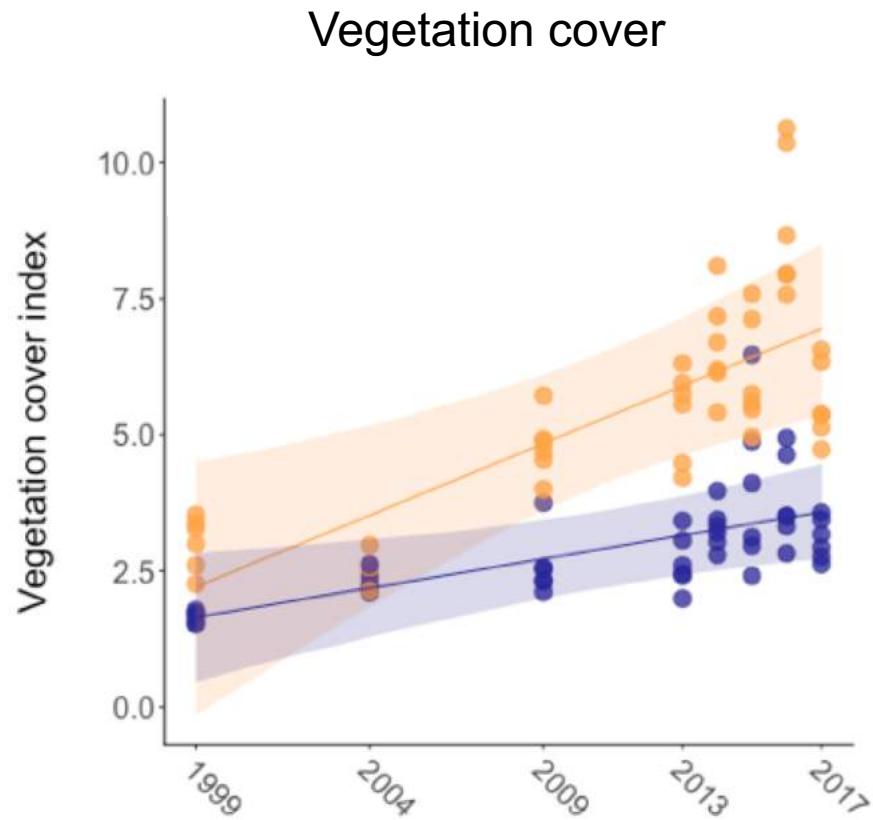


COMMUNITY COMPOSITION

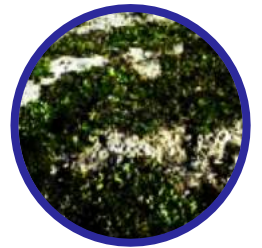




How is tundra vegetation changing?



HERSCHEL

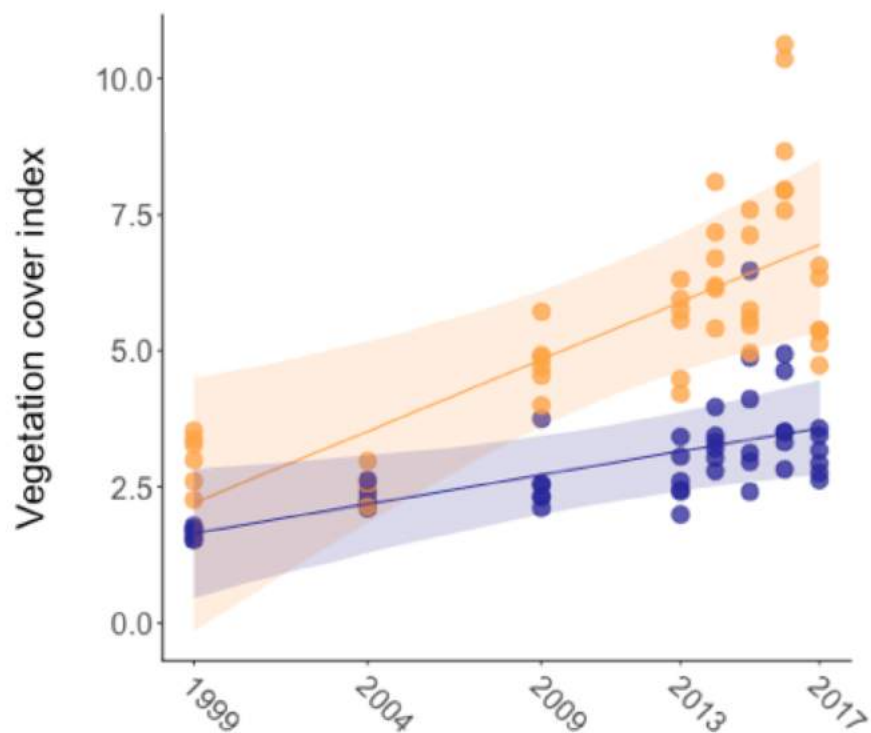


KOMAKUK

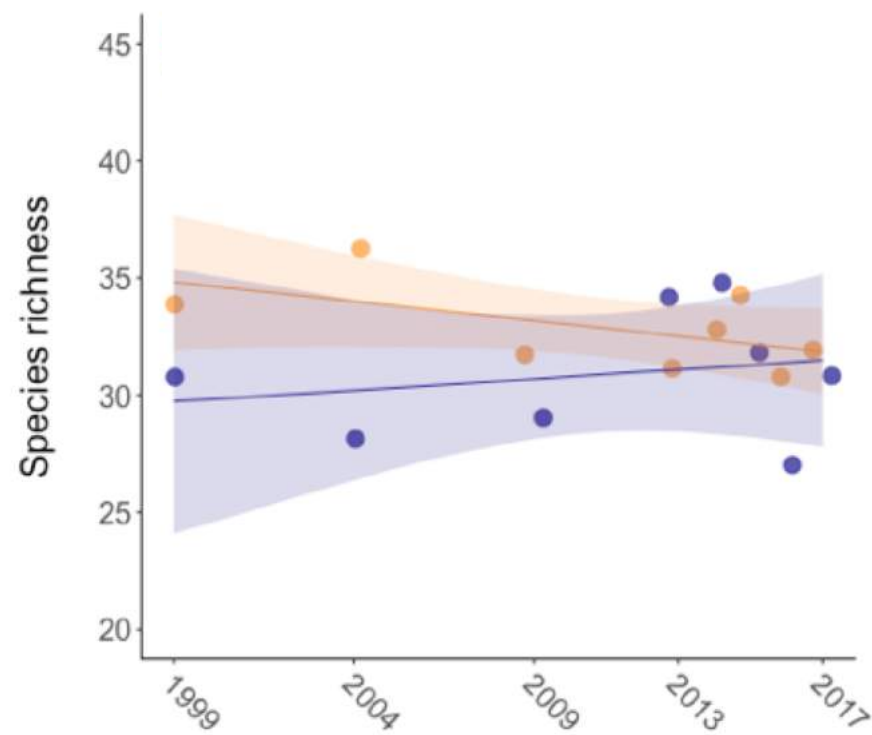


How is tundra vegetation changing?

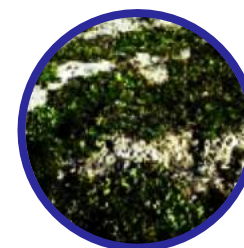
Vegetation cover



Species richness



HERSCHEL

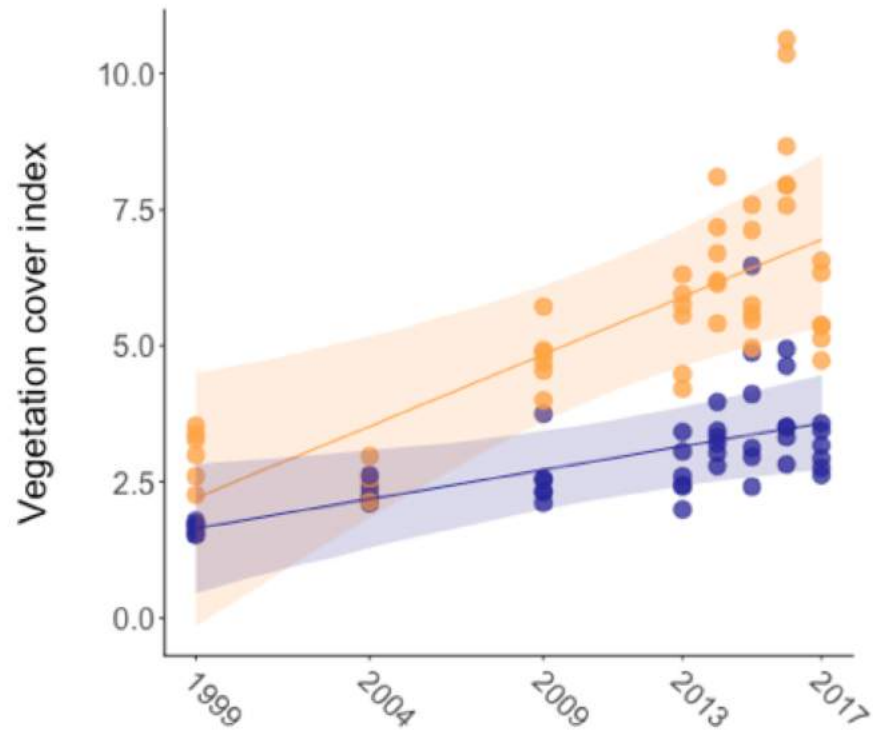


KOMAKUK

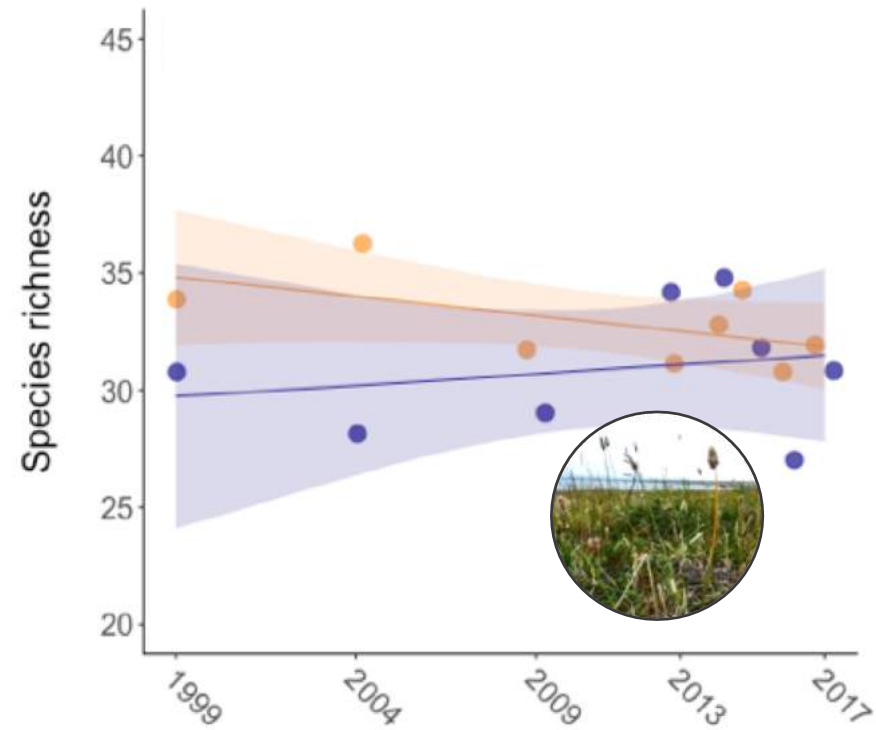


How is tundra vegetation changing?

Vegetation cover



Species richness



HERSCHEL

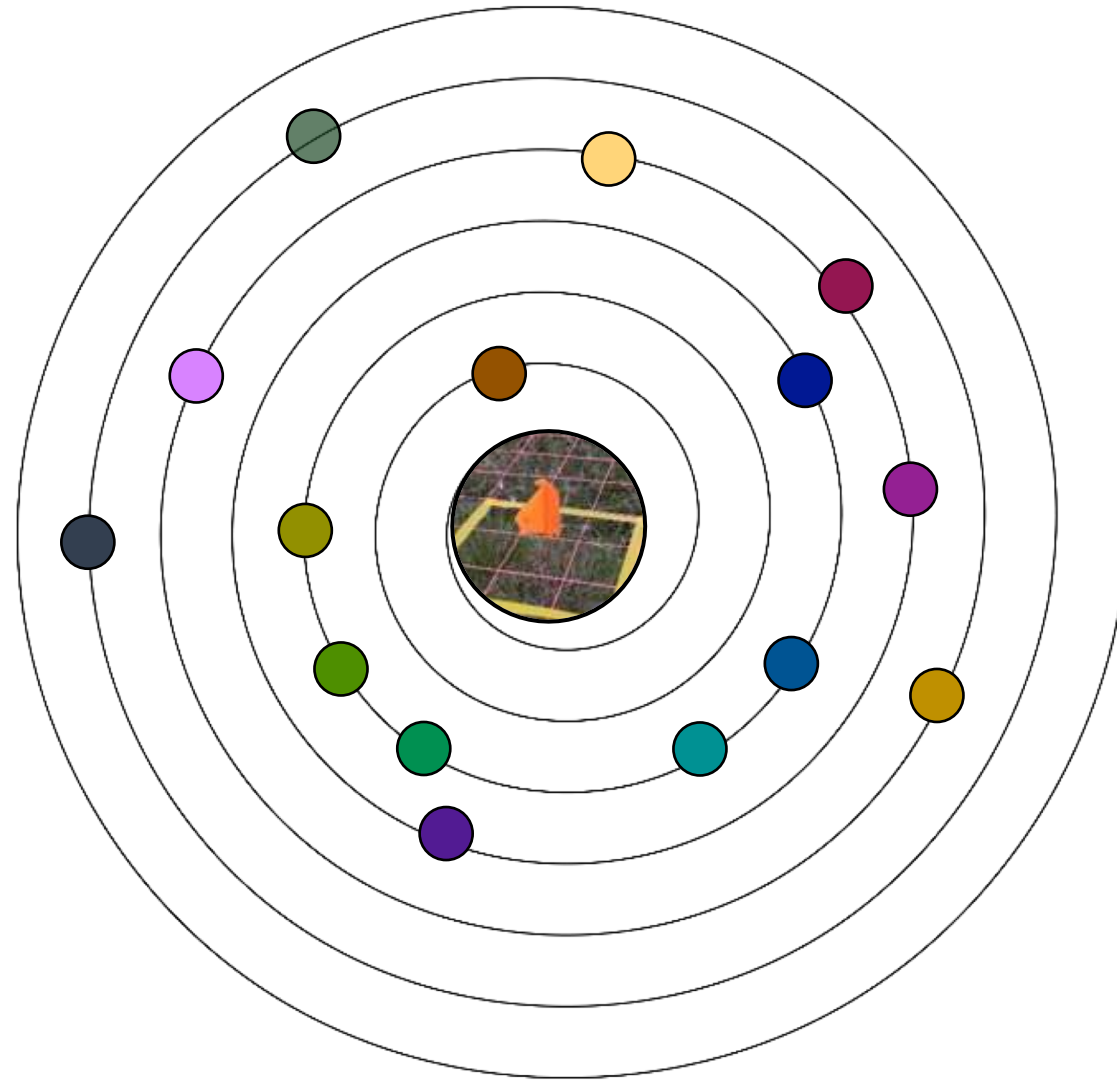


KOMAKUK



SPECIES POOL MONITORING





100 m



Saxifraga hirculus

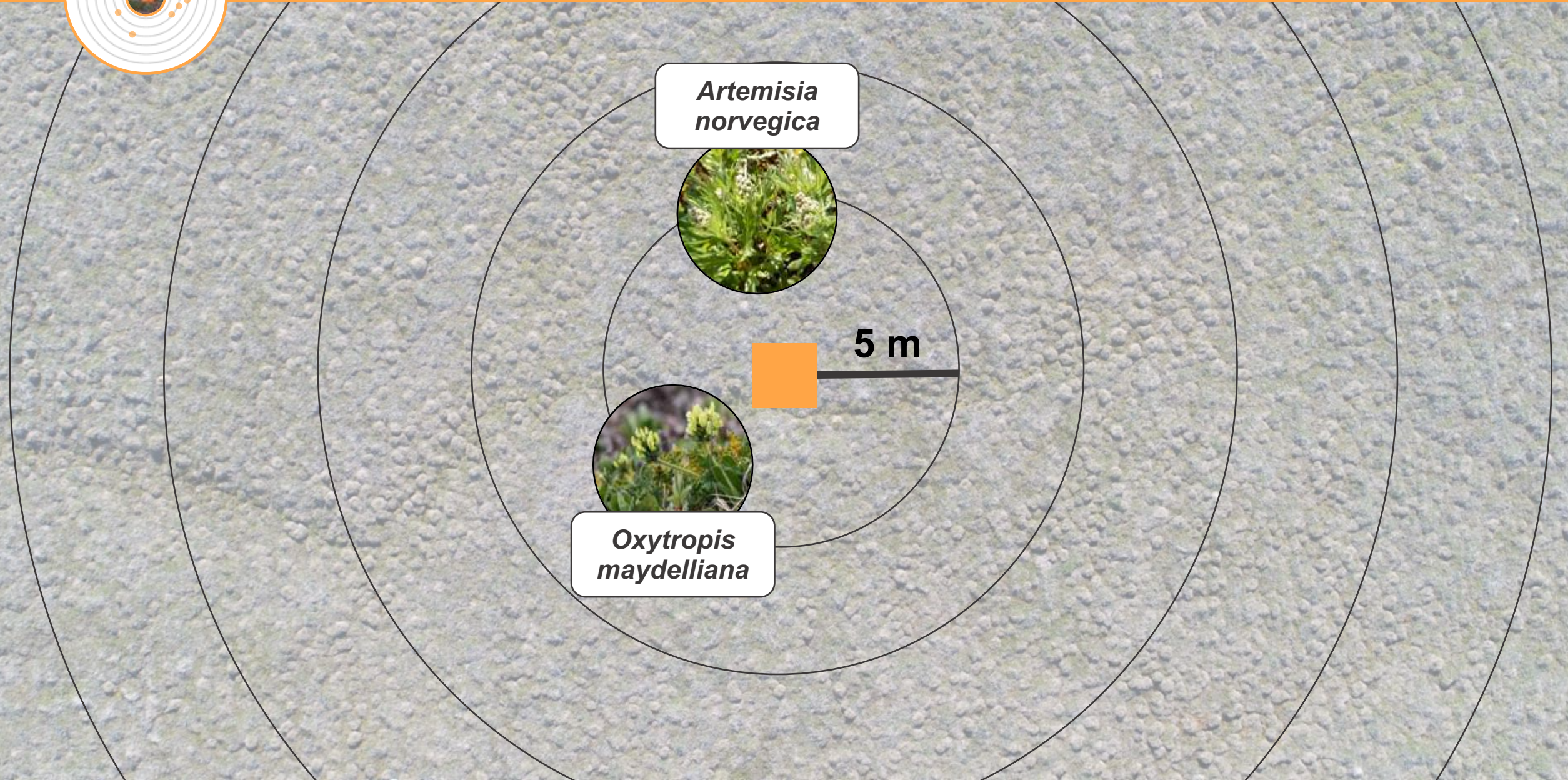


Species pool – Herschel vegetation





Species pool – Herschel vegetation





Species pool – Komakuk vegetation





Species pool – Komakuk vegetation

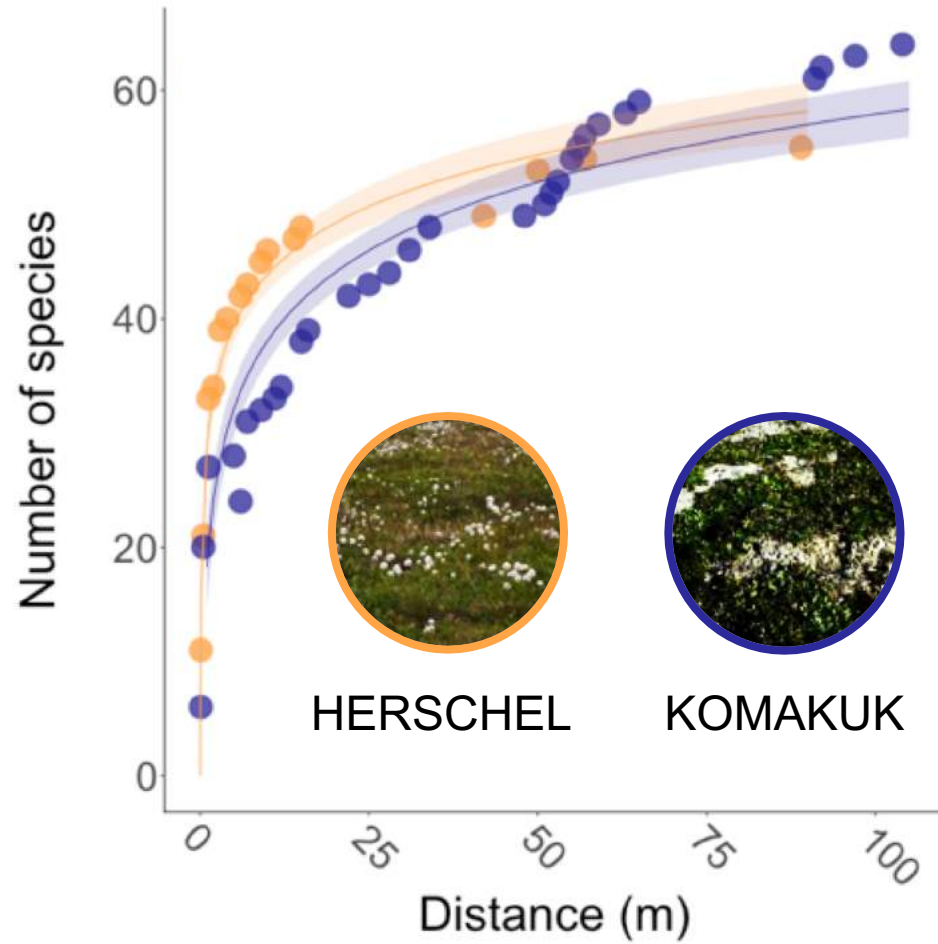
*Saxifraga
nelsoniana*



5 m



*Parrya
nudicaulis*



Species that have not yet been observed in the long-term monitoring plots:

13

WITHIN 100 M OF
THE HERSCHEL PLOTS

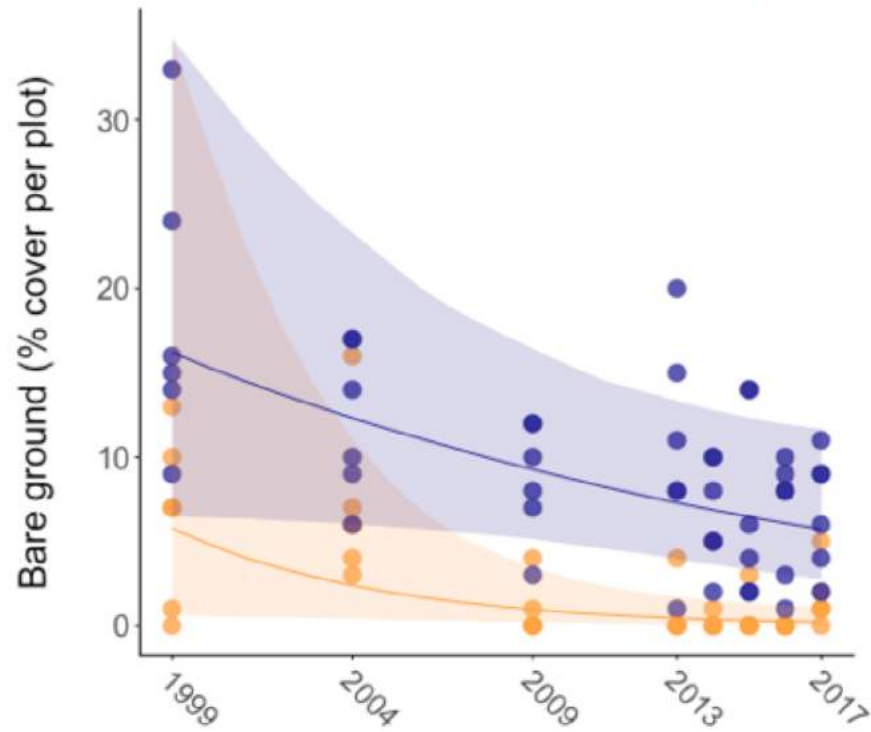
26

WITHIN 100 M OF
THE KOMAKUK PLOTS

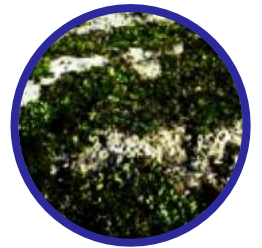


How is the environment changing?

Bare ground



HERSCHEL

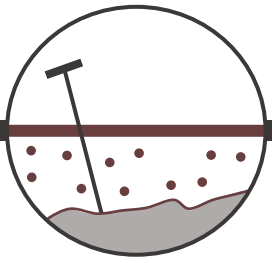


KOMAKUK

ACTIVE LAYER MONITORING

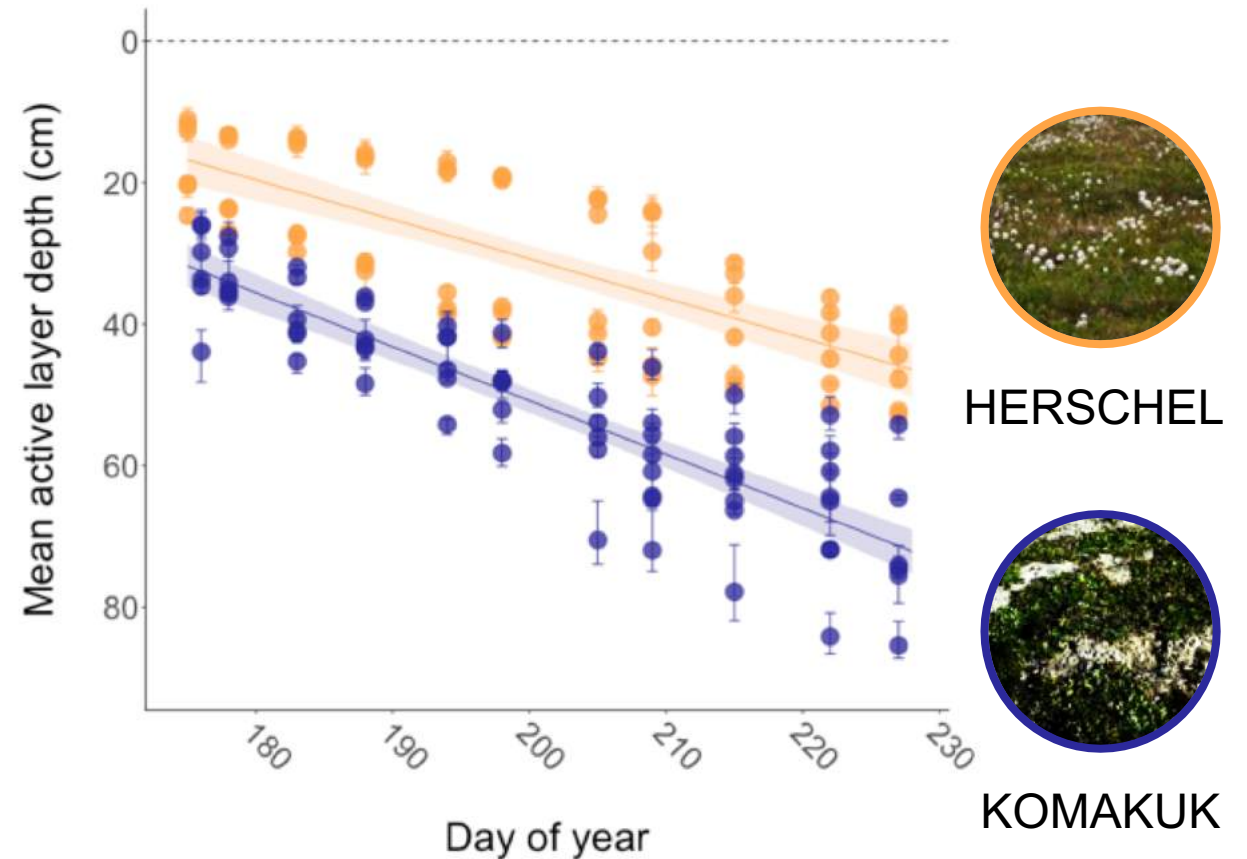


Jeff Kerby

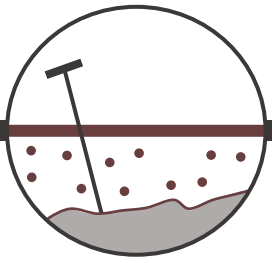


Active layer depth across the 2017 season

- **Herschel – max 58.5 cm**
- **Komakuk – max 87.2 cm**

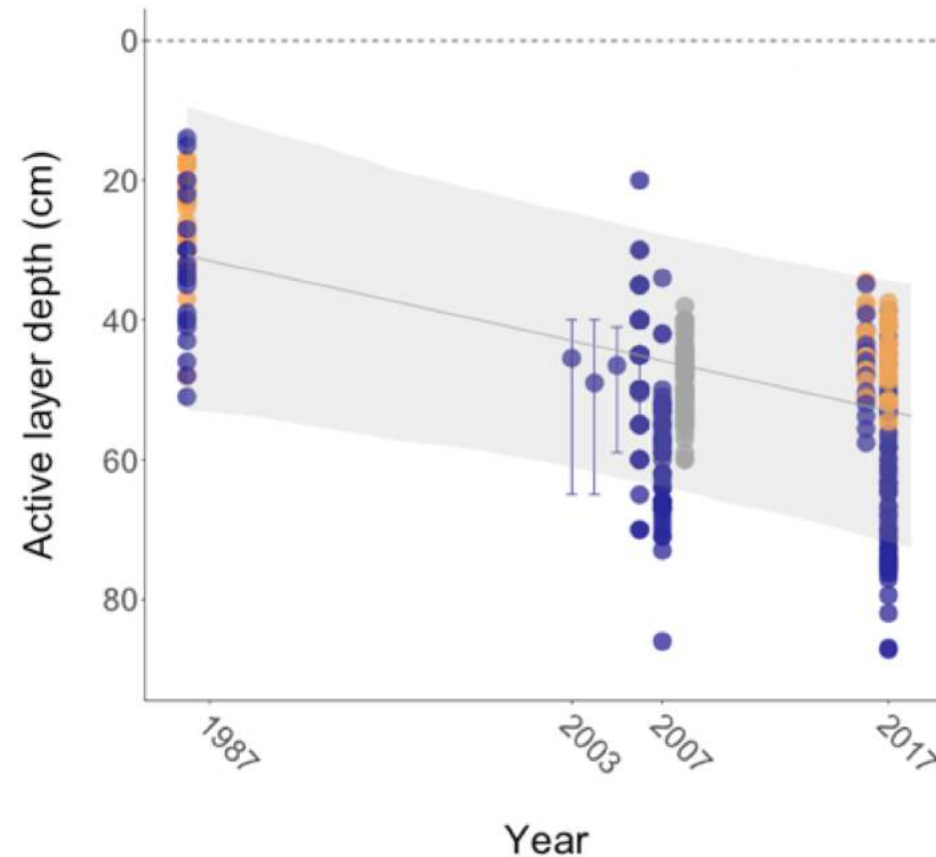


⌋ *Might need a longer probe soon!*

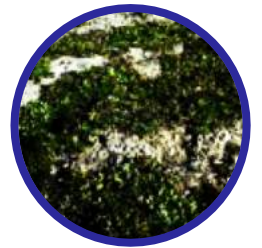


Active layer depth across years

Mean increase in active layer depth by as much as **20 cm** over **20 years**



HERSCHEL



KOMAKUK



 *Might need a longer probe soon!*

Smith et al. 1989, Burn and Zhang 2009,
ArcticWOLVES project &
Myers-Smith *et al.*, submitted



What's next?

?

Where are the potential sources of new species?

?

How do diversity patterns vary across landscapes?

H

Species-accumulation curves are steeper in more homogeneous landscapes.



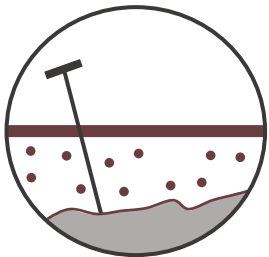
SUMMARY



Advancing phenology, increases in shrub cover and canopy height



Species pool and future invasions might further alter biodiversity patterns



Almost doubling of the active layer depth in the last 20 years

QIKIQTARUK PERSPECTIVES BY RANGER EDWARD MCLEOD



SEPTEMBER 28, 2017 | GNDASKALOVA | EDIT

Edward McLeod is a park ranger on Qikiqtaruk – Herschel Island from Aklavik, NWT. Here he shares his perspectives on working as a park ranger and the collaboration between the rangers and researchers here on the island.

CHANGES ON QIKIQTARUK: PERSPECTIVES FROM RANGER RICKY JOE

AUGUST 14, 2017 | TEAMSHRUB | EDIT

Ricky Joe is a park ranger on Qikiqtaruk – Herschel Island from Aklavik, NWT. Here he shares his perspectives on life in the Arctic, working on the land, and the changes he has observed on Qikiqtaruk.

