

Dark diversity in the tundra: the source of future biodiversity change?

**GERGANA
DASKALOVA**
PHD STUDENT,
UNI OF EDINBURGH

with Isla Myers-Smith, Christian Rixen, Anne Bjorkman, Toke Høye, Greg Henry, Nicoletta Cannone, Rien Aerts, Petr Macek, Jacob Harris, Kayla Arey, Zoe Panchen, Elise Gallois, Sofie Agger, Cassandra Elphinstone, IngaSvala Jonsdottir, Sonja Wipf, Isabel Barrio, Alessandro Petraglia, Michele Carbognani, Marcello Tomaselli, Anne Tolvanen and the ITEX Species Pool Consortium



@gndaskalova



gndaskalova.com



#TeamShrub

Isla Myers-Smith



“Panoramas never twice alike”

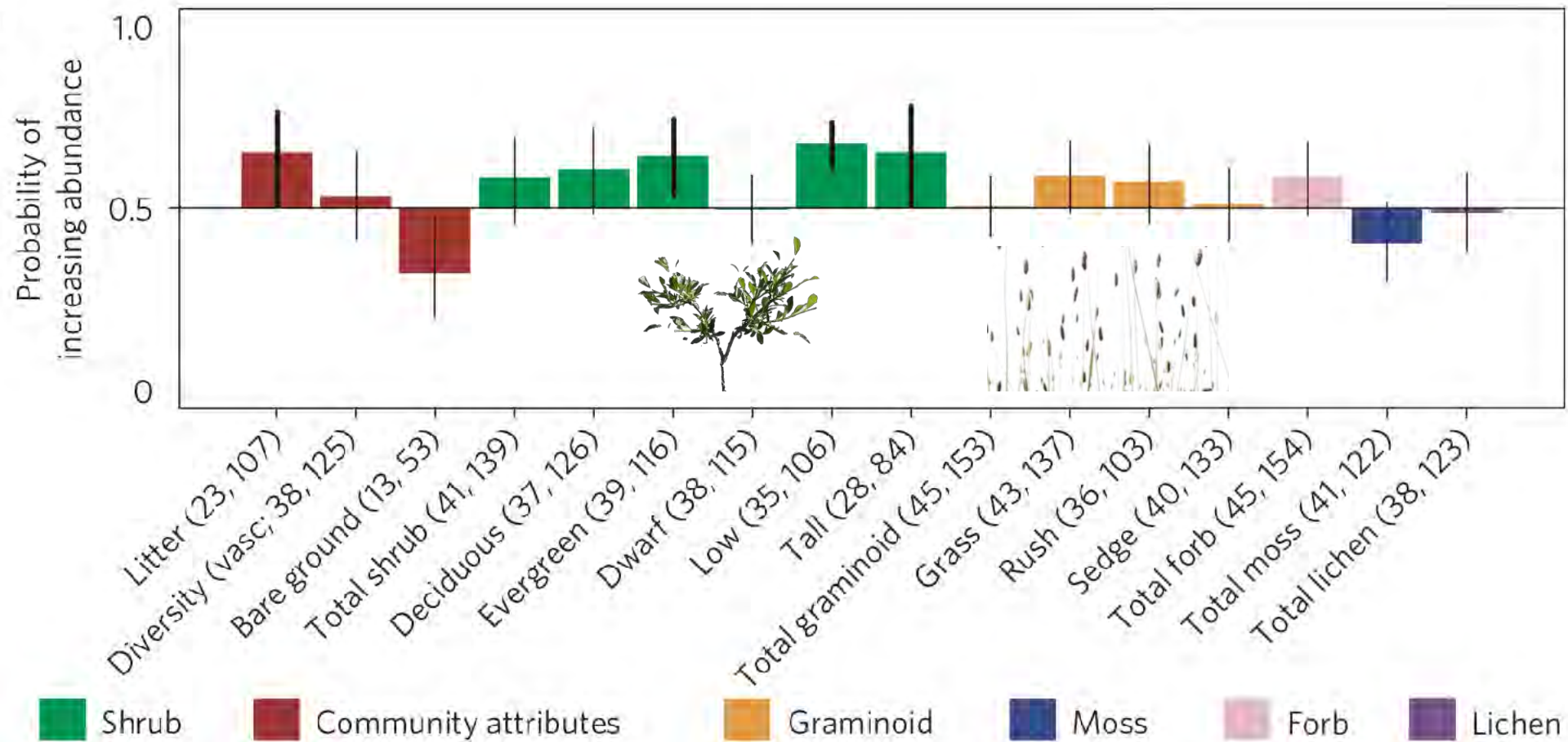
Henry Cowles 1899



Jeff Kerby



The composition of tundra plant communities is changing



The traits of tundra plant communities are changing

Tundra plant communities
are getting taller



New species invading
communities over time



Bjorkman *et al.* 2018, Nature

Beyond the plots





Research questions



How do species pools vary across the tundra?



How much diversity is there hidden beyond the ITEX plots?

SPECIES POOL

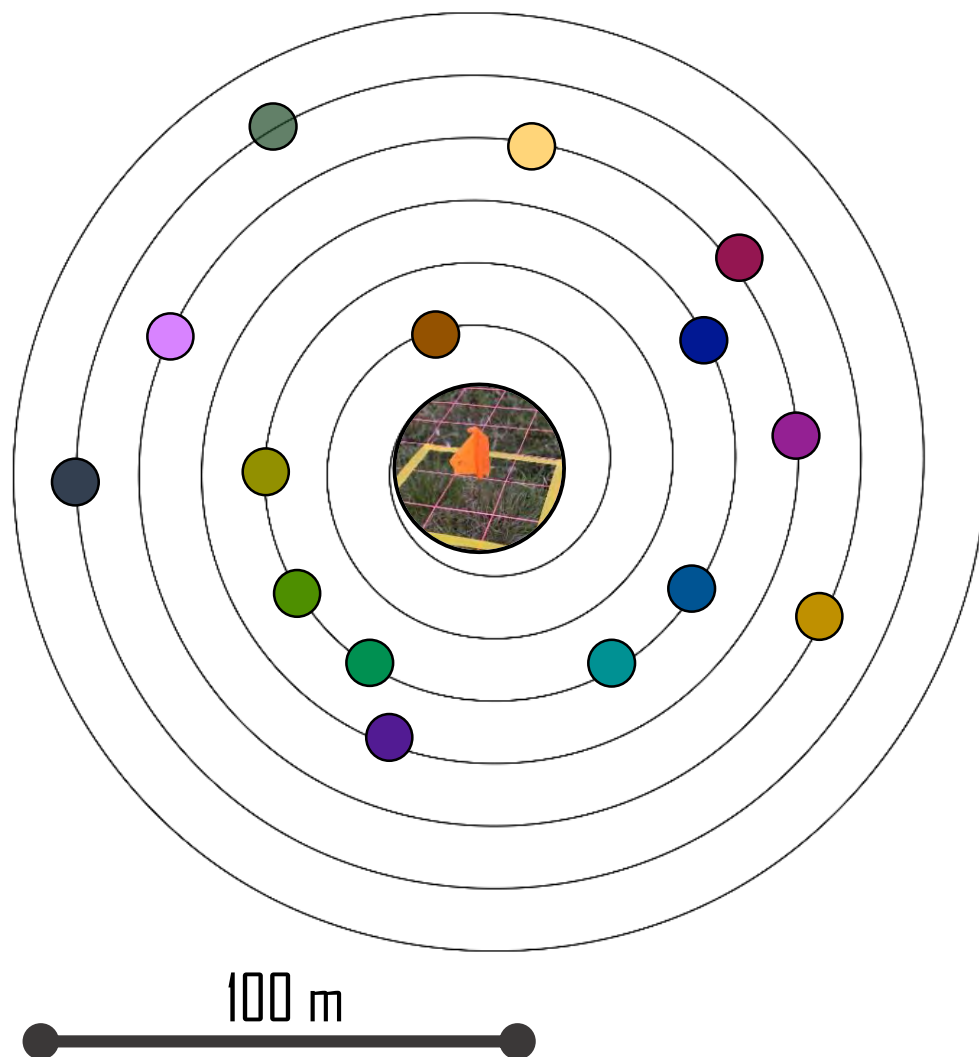
"All species that are present in an ecological community."



Gergana Daskalova



The ITEX Species Pool Protocol





14 sites
29 plant communities

More on the way!



Qikiqtaruk

Utqiagvik

Svalba

Ellesmere

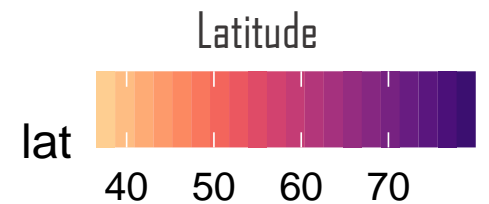
Narsarsuaq

Abisko

Stelv

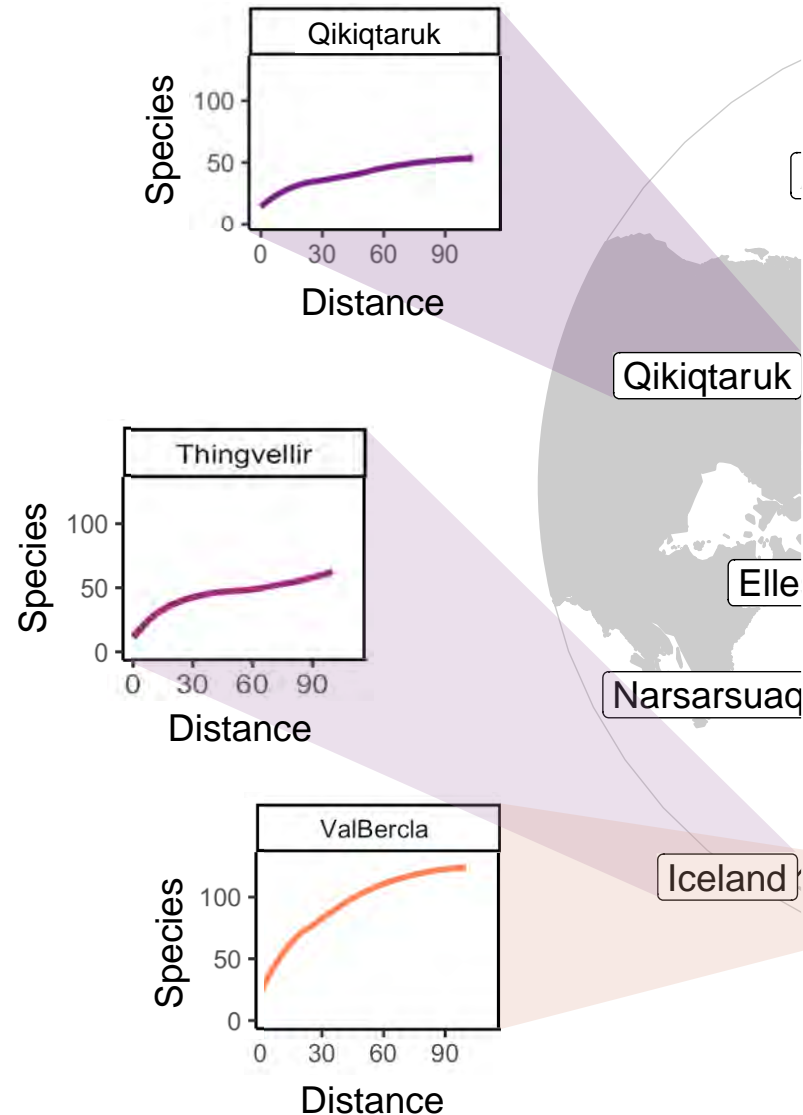
Iceland

ValBercla



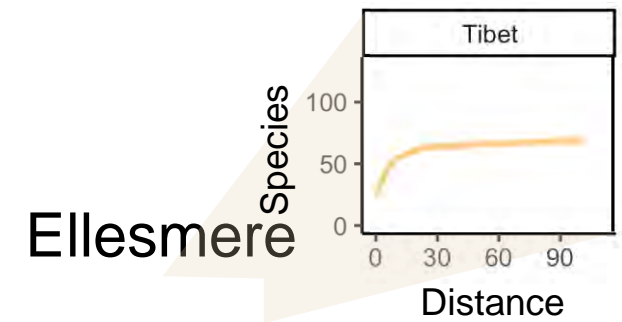


How do species pools vary across the tundra?



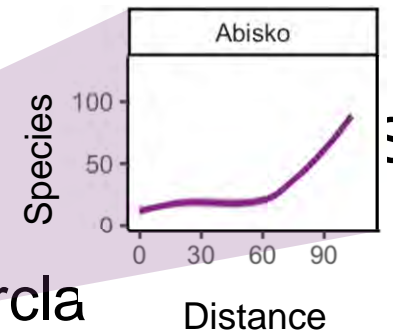
Qikiqtaruk

Utqiagvik



Svalba

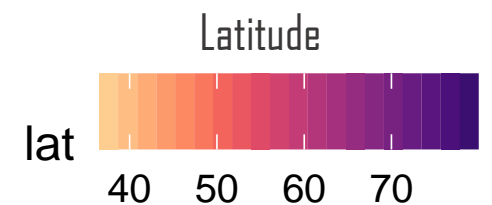
Narsarsuaq



Stel

Iceland

ValBercla



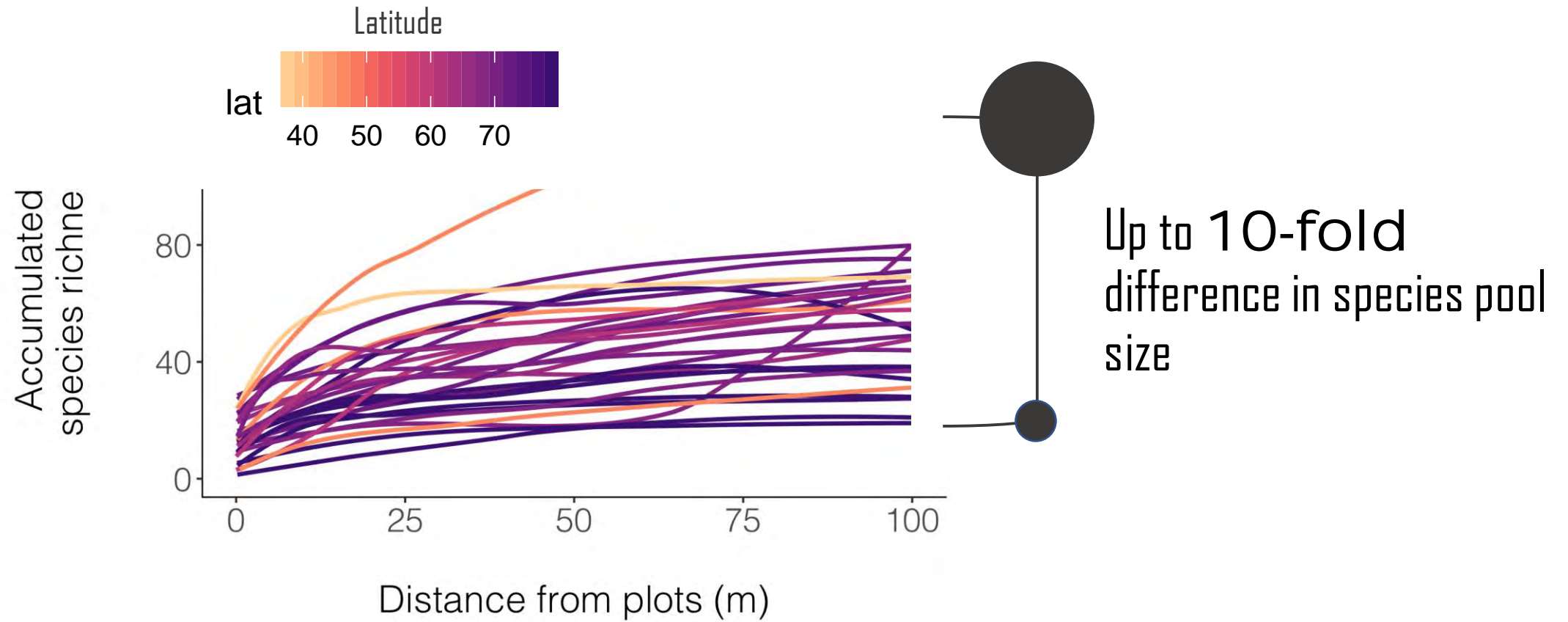
Abisko

Stelvio

Iceland

ValBercla

Gavia





Why do species pools matter?

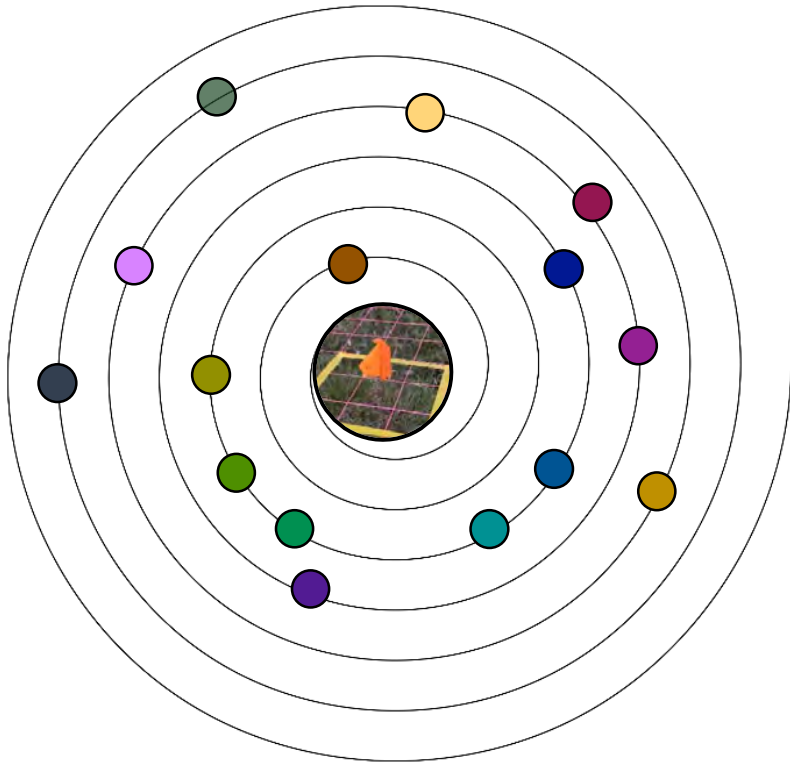
Colonisation
Competition
↓
Composition
↓
Function

DARK DIVERSITY

"All species that are present in an ecological community but have never been recorded inside the plots."



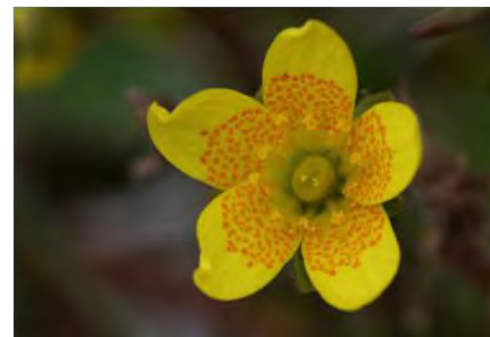
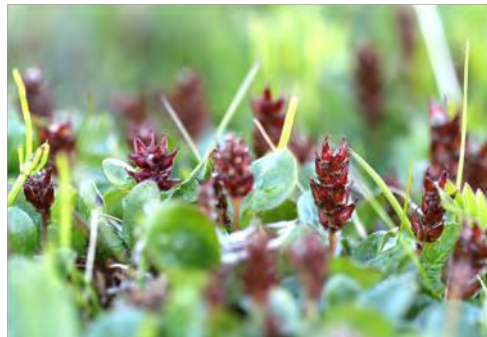
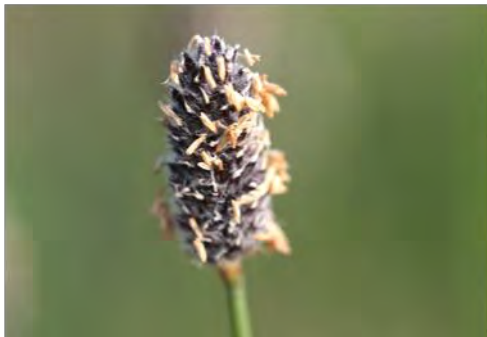
How much diversity is there hidden beyond the ITEX plots?



+









Narsarsuaq

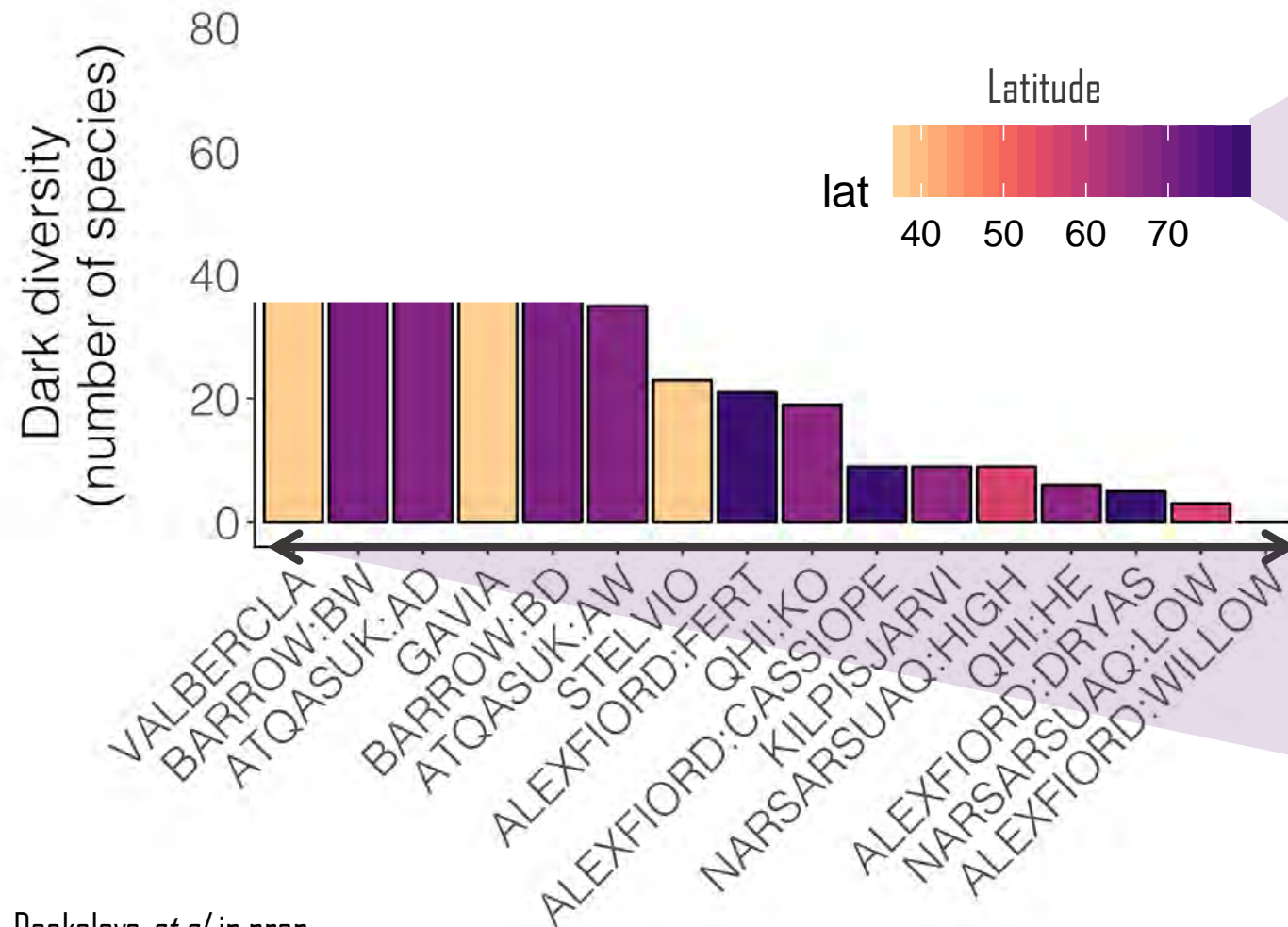
Abisko

Stelvio

Iceland

ValBercla

Gavia



Weak latitudinal
gradient in dark
diversity

30

species on average that have
never been detected inside plots



Why does dark diversity matter?

Higher dark diversity




Future biodiversity change
Species detectability & monitoring

What's next?

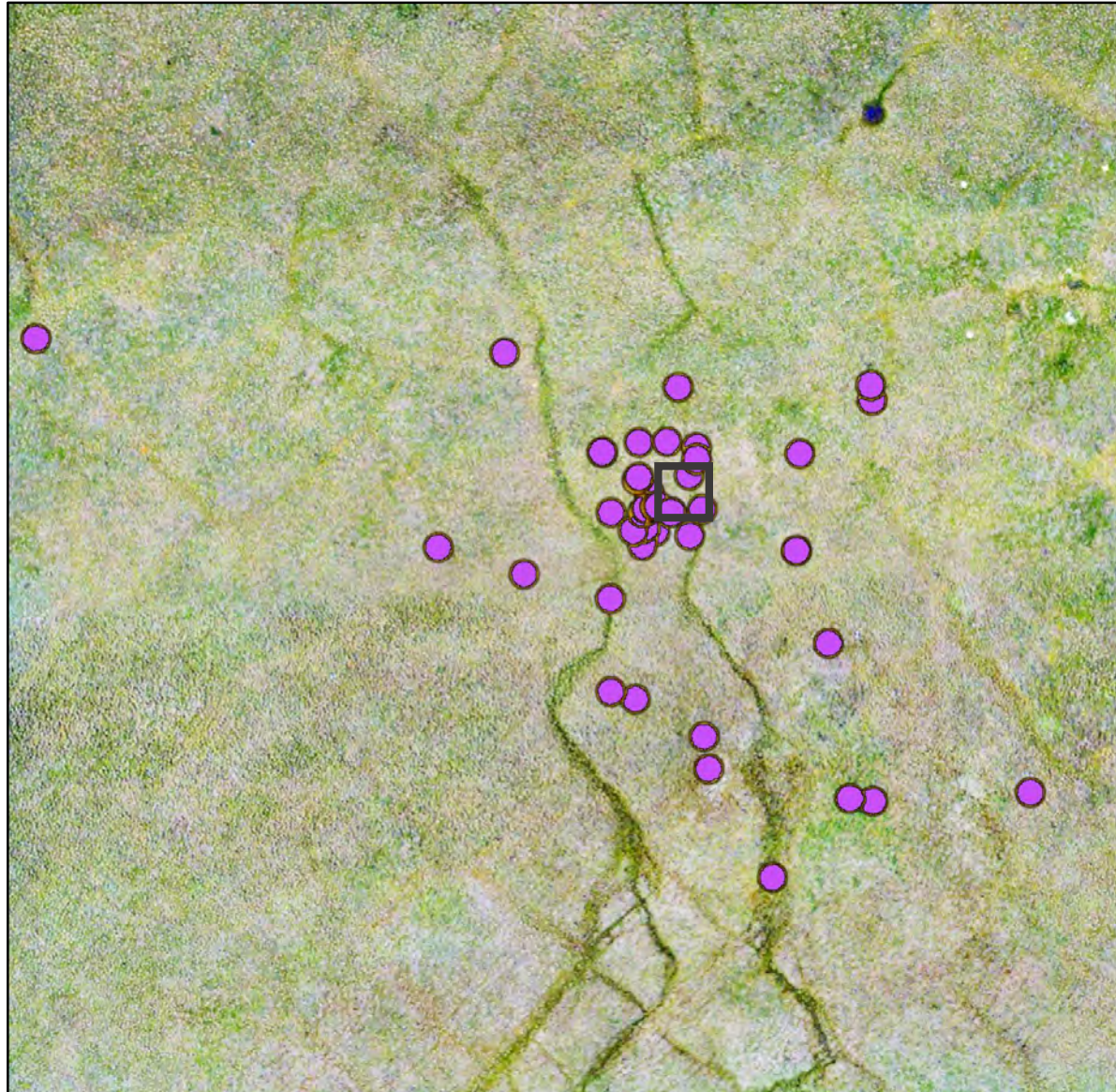


Jeff Kerby



Where are the
hotspots of dark
diversity?

Prediction: *In warmer and wetter microclimates?*





Research questions



Species pools across the tundra vary up to 10 times, likely due more to topographic variation than latitude.



Biodiversity is out there, but we can miss it in our plots.

On average there are 30 species just outside plots that could be the source of future tundra biodiversity change.

KEY MESSAGE

By looking beyond the plots, we can better understand ongoing and future biodiversity change across the tundra biome.



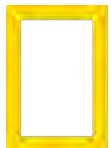
@gndaskalova



gndaskalova.com



#TeamShrub



NATIONAL
GEOGRAPHIC
SOCIETY



NERC
SCIENCE OF THE
ENVIRONMENT



SAGES
Scottish Alliance for Geoscience, Environment and Society

The LINNEAN
SOCIETY
of London

Royal
Scottish
Geographical
Society