Changes in the Arctic

Getting to the root of the problem

Why Roots?

Understanding roots and belowground processes helps us understand community function and to predict the fate of trapped carbon in the Arctic.

Up to 80% of plant biomass in the Arctic is belowground[2].

Many Arctic plants have associations with mycorrhizal fungi, exchanging carbon and nutrients.

The permafrost *(soil that is frozen for at least 2 years)* stores up to a third of all carbon in soils, and more than twice the amount of carbon in our atmosphere[3].

Climate change is disproportionalty affecting the Arctic.

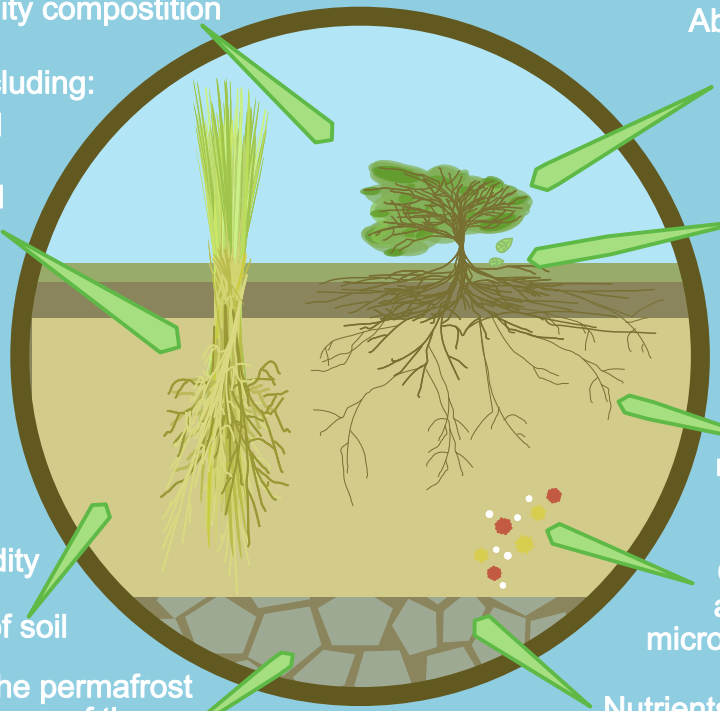
This is in part down to the weakening of the Albedo Effect, where snow and ice reflect the sun's energy.

Some regions of the Arctic have warmed by up to **5°C** already[1].

By 2100, the Arctic is predicted to experience[1]:

- longer summers and a warmer climate overall
- **50%** increase in precipitation
- more droughts and wildfire events
- proportionally less snow

Changing temperature and precipitation could impact...



- Plant community compostition
- Root traits, including:
  - growth and biomass
  - carbon and nutrient content
  - root length and thickness
  - branching density
  - distribution in the soil
- Mositure, acidity and thermal conductivity of soil
- The state of the permafrost and the thickness of the active (thawed soil) layer
- Aboveground plant growth, function and traits
- The content of leaf litter and decaying material
- Growth and function of mycorrhizal fungi
- Composition and activity of the soil microbiota community
- Nutrients released from the permafrost thawing

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References: 1) IPCC, 2014; https://www.ipcc.ch/report/ar5/syr/, 2) Iversen *et al.*, 2015; http://doi.wiley.com/10.1111/nph.13003 3) Schuur *et al.*, 2018; https://www.nature.com/articles/nature14338