

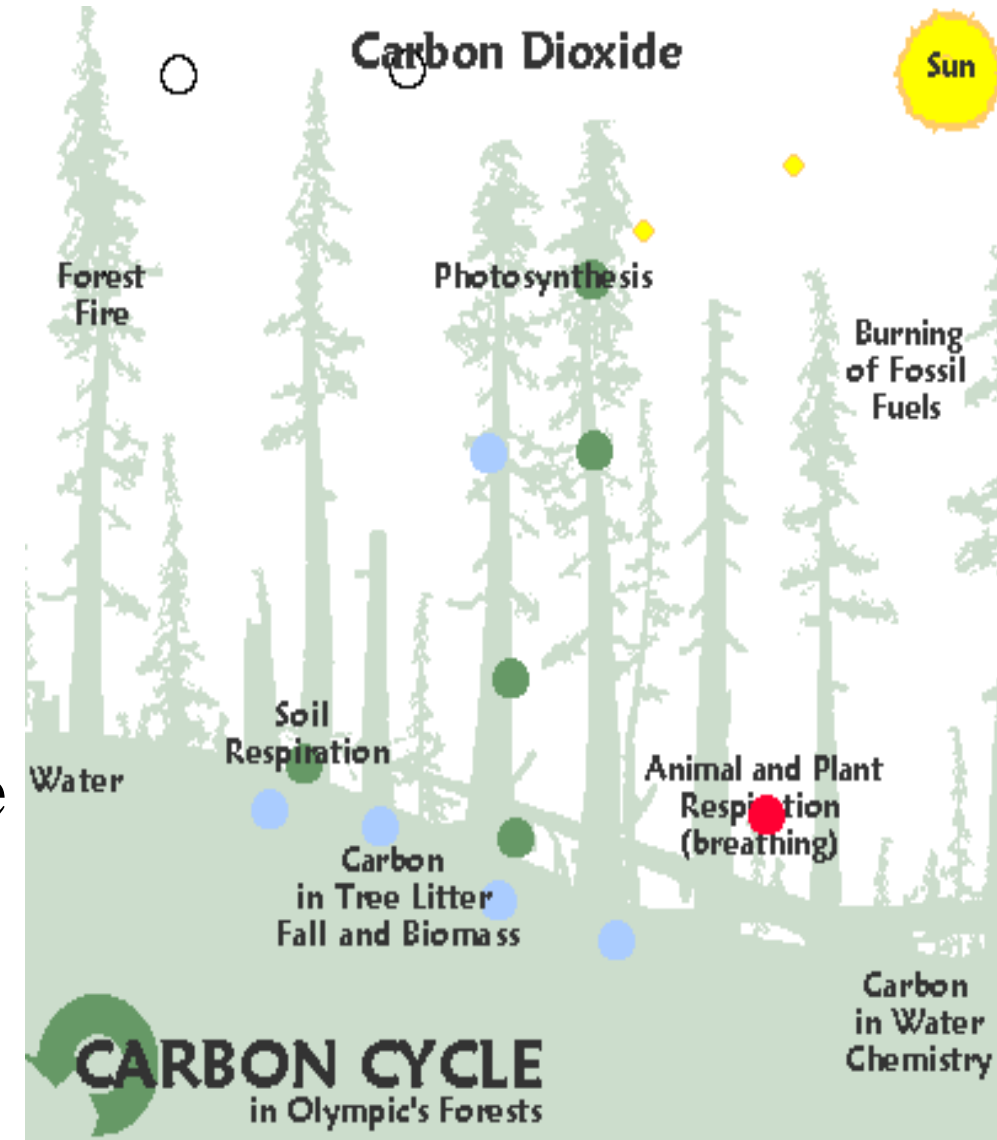
Soil is the biggest forest C stock in Iceland

Joel C. Owona

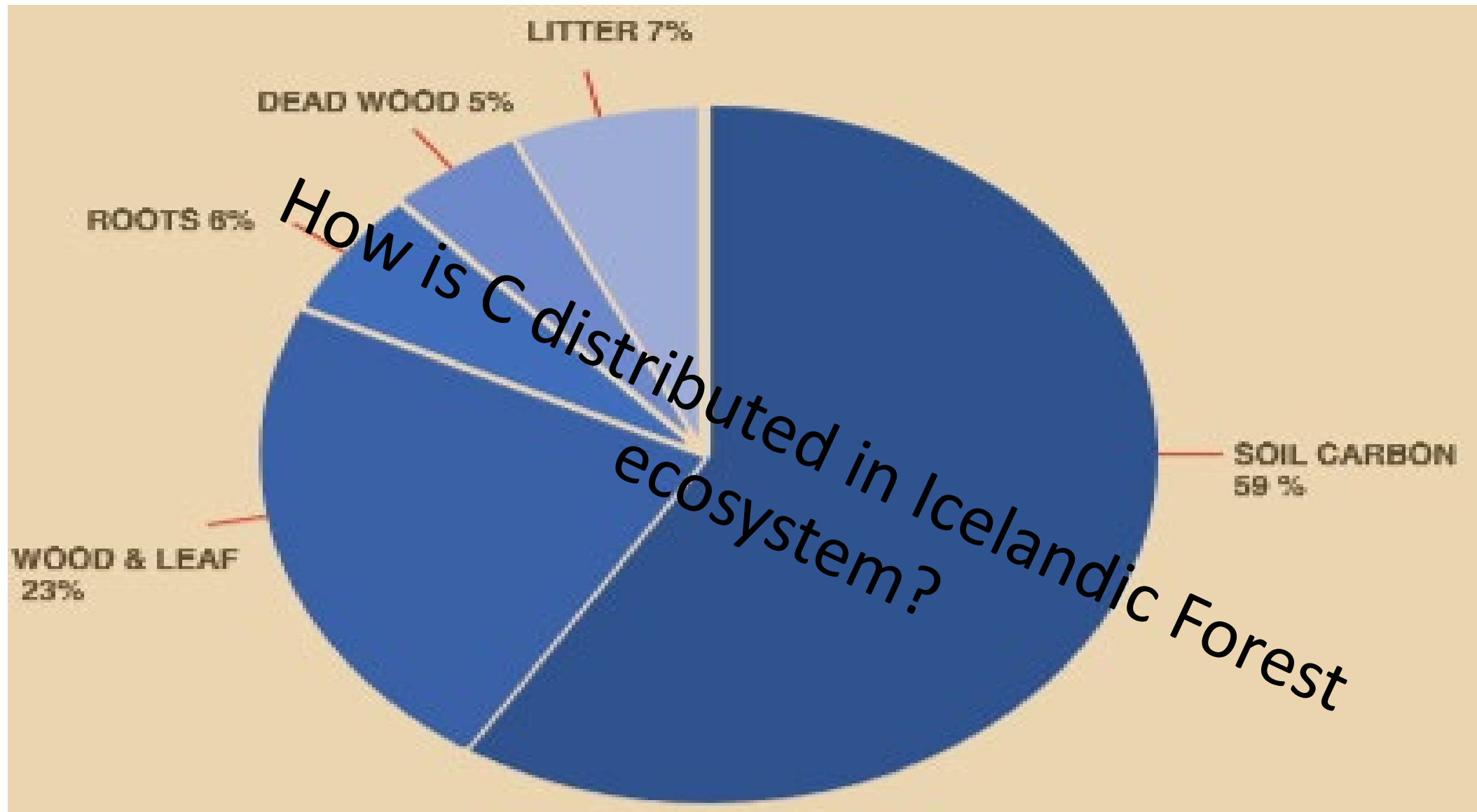
MSc. student AUI

Introduction

- Forests have many values
 - Renewable resource of wood
 - Habitat for many organisms
 - for recreation activities
 - Important in many ecosystem services
 - Water cycle
 - **Carbon cycle and climate change mitigation**



Distribution of C in European forests ecosystem

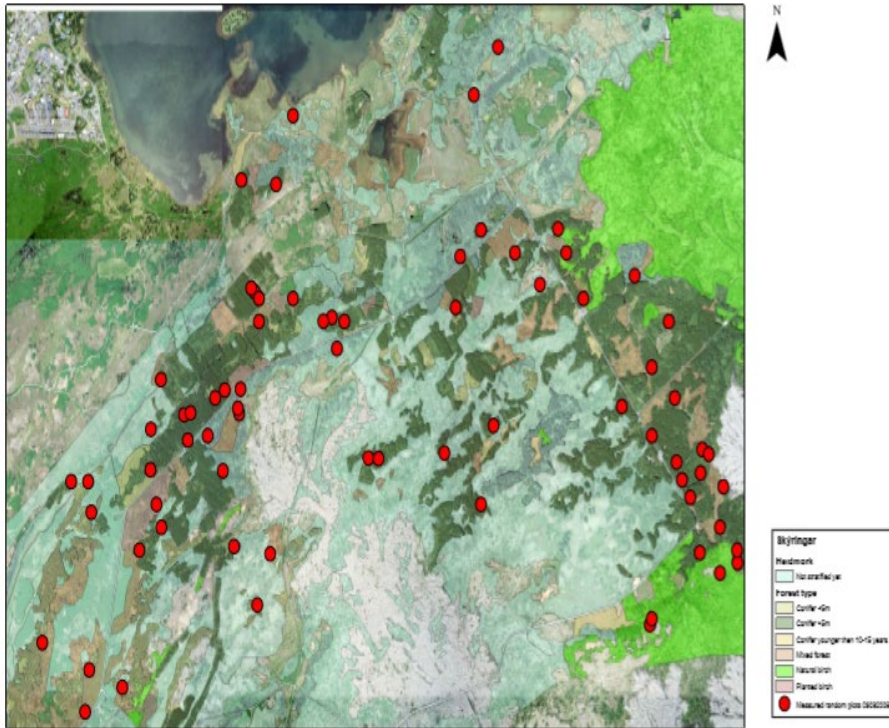


Aim of the study

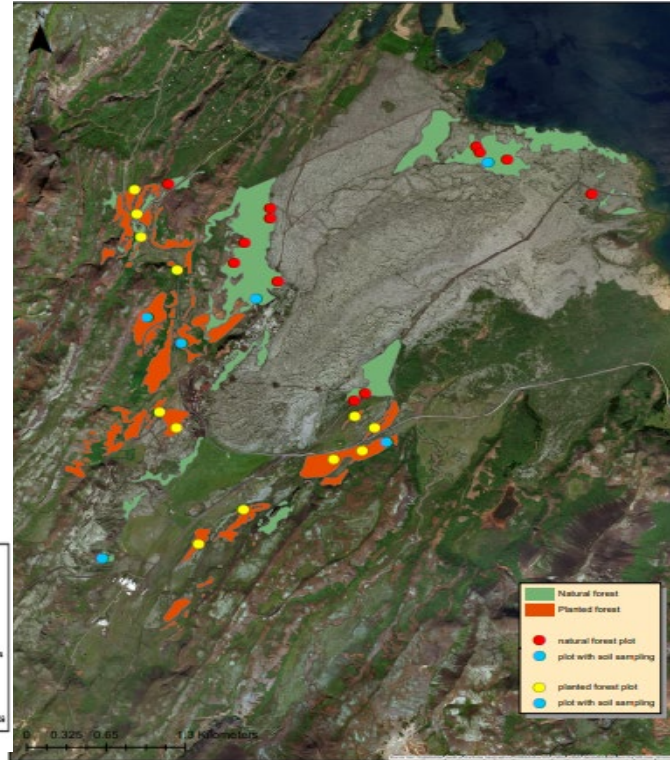
- Assess C stock changes in soil, tree biomass, litter, roots and ground vegetation following afforestation with **different tree species**
- Study age-related changes in ecosystem C-stocks and sequestration rate

Experimental sites

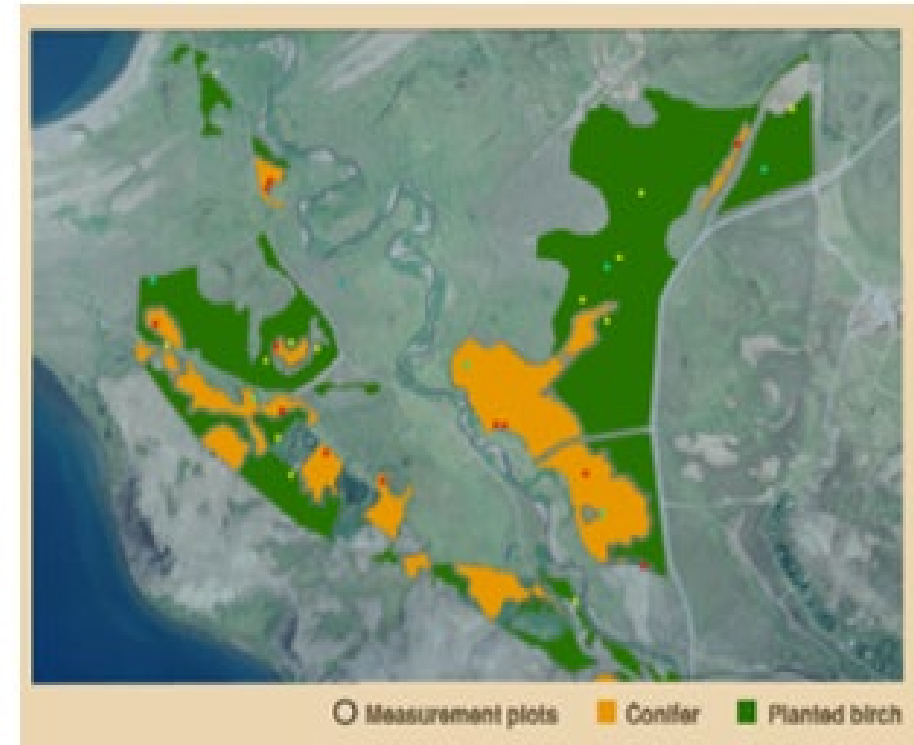
Heidmork - Sample



Heiðmörk



Nesjavellir



Ölfusvatn at
Thingvallavatn

Plot design and field measurements

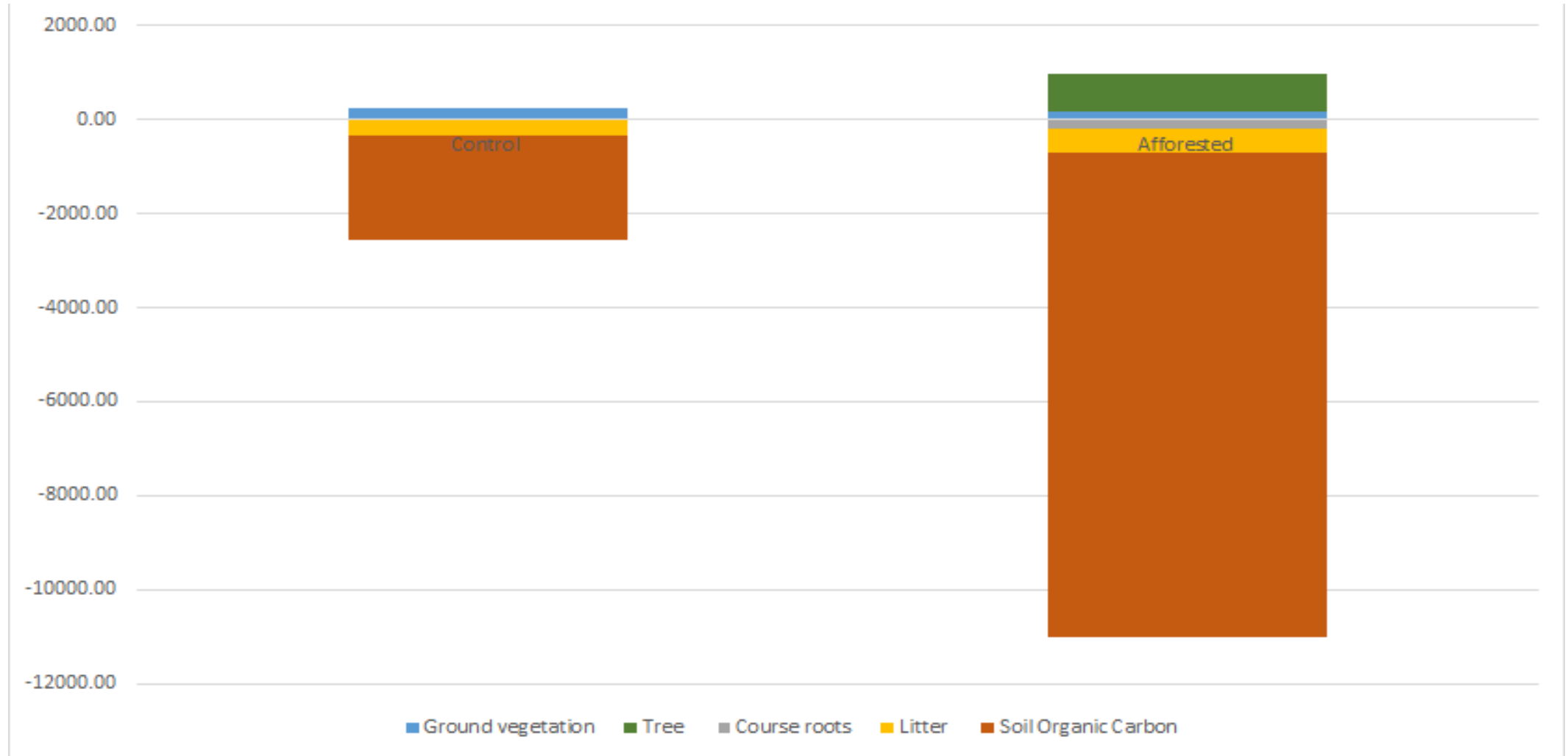
- Using GIS tool and aerial photos
- Randomly laid 122 plots for tree biomass C stock and cored tree rings for age determination
 - Placed 29 plots in afforested and 23 in treeless plots for below-ground C stock
- Harvested ground vegetation, litter and soil from 0-5; 50-10; 10-20 & 20-30 cm depths
- Lab work and analysis



Changes in C stock following afforestation

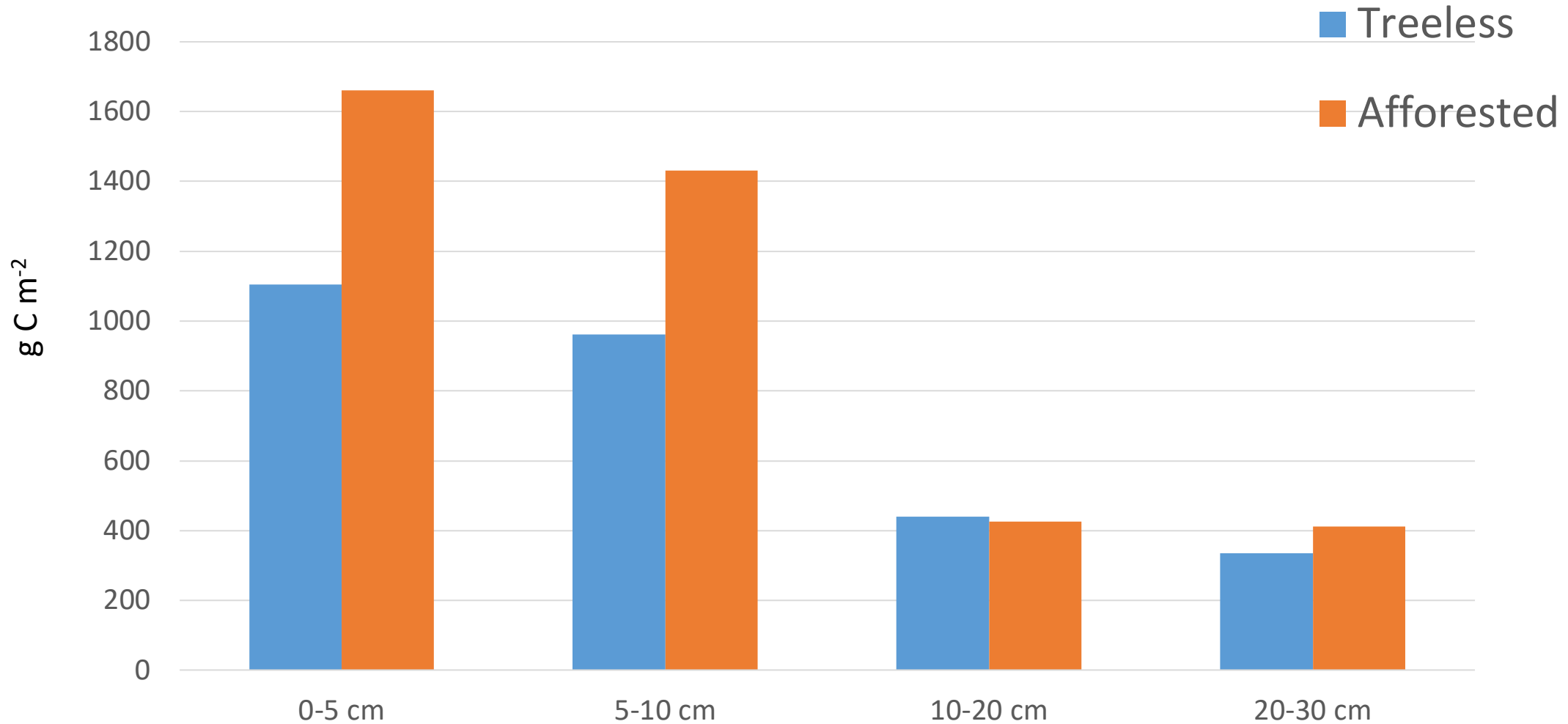
	Treeless			Afforested		
Variables	Mean	SE		Mean	SE	P-values
SOC	2131	112	<	2553	102	0.008
SON	128	7.3	<	149	5.9	0.02
Litter	311	41	<	689	76	0.0002
Vegetation	193	24	=	137	20	0.08

Average C stock in Ölfusvatn (g m⁻²)



Above-ground are +ve values and below-ground are -ve values

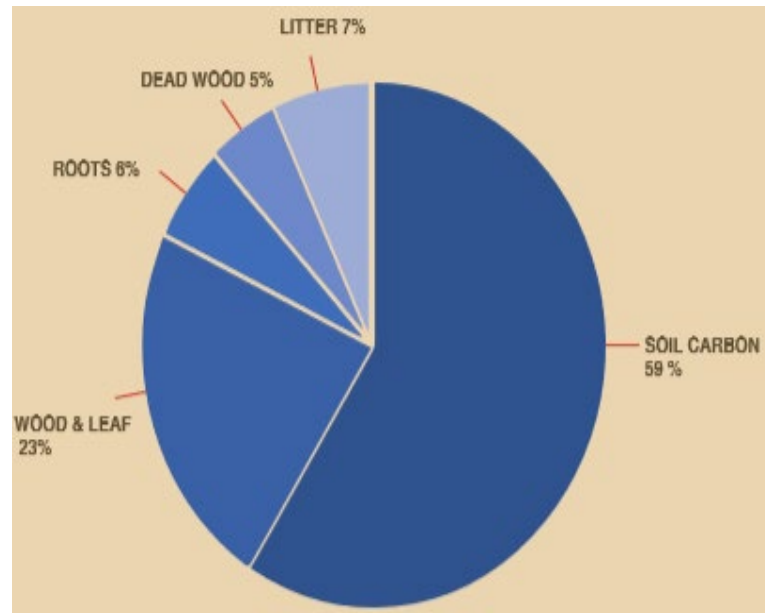
The changes is happening in the 0-10 cm depth



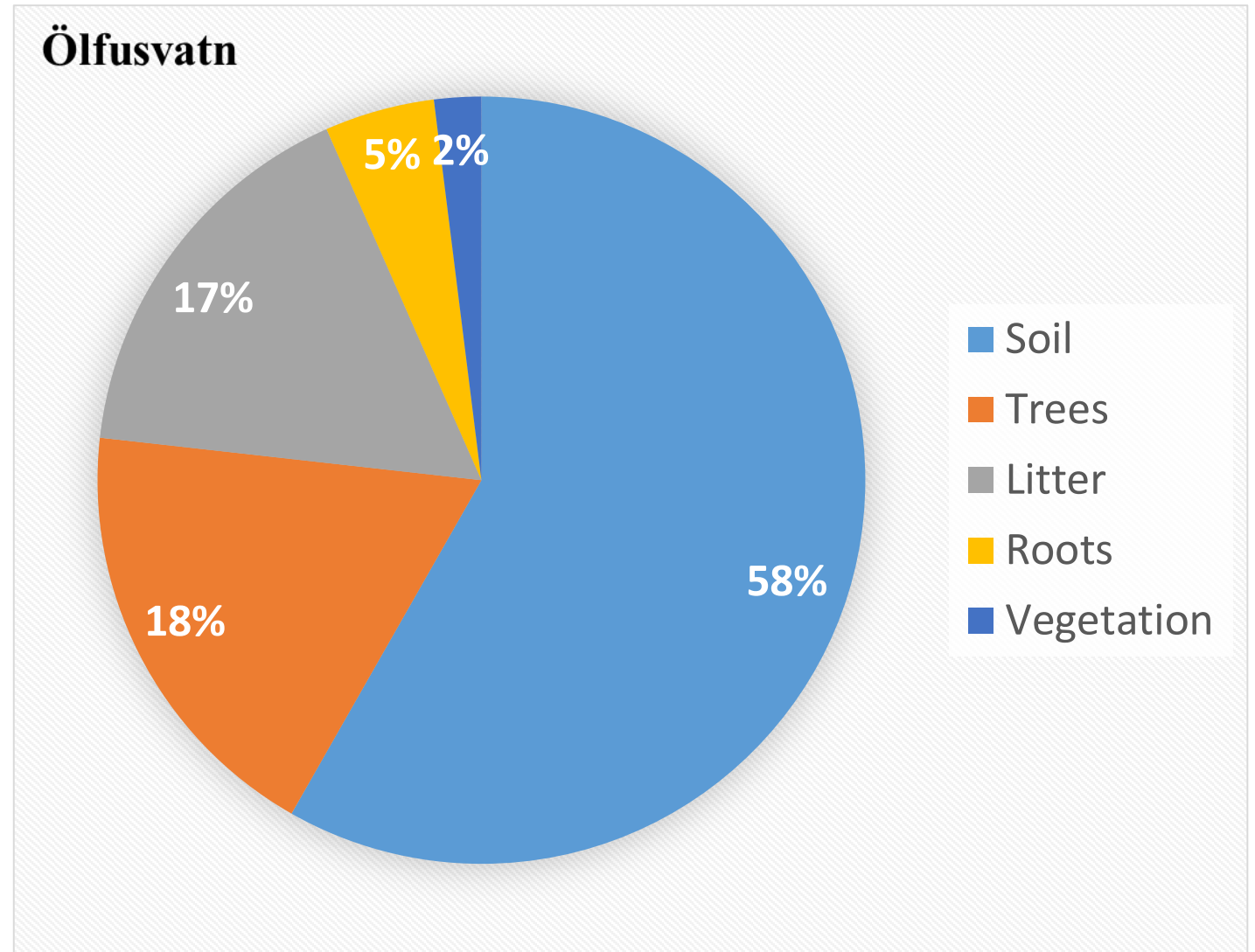
Distribution of C in Icelandic and European forest ecosystem

The biggest forest C-stock is in the soil

Europe



Ölfusvatn



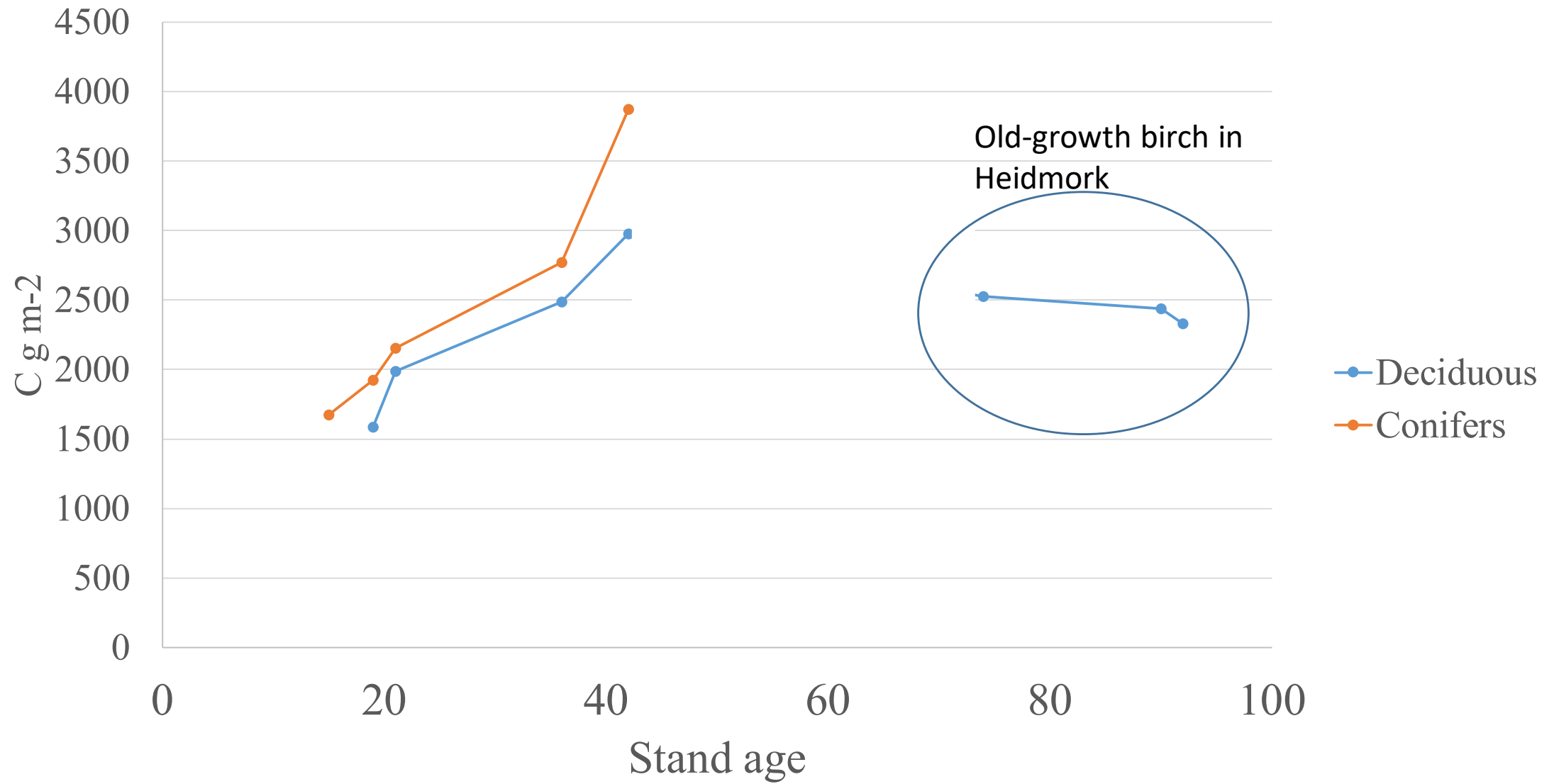
Does the tree species matter?

Variables	Coniferous trees	Deciduous trees	Mixed	P-values
SOC	2582	2366	3174	0.07
SON	149	139	194	0.02 No!
Litter	888	496	529	0.03 Yes!
Vegetation	71	222	106	0.0002 Yes!
pH	5.16	5.23	5.40	0.2 Yes! No!

Icelandic soil does not get acidified under conifers

See; Bjarni D. Sigurdsson (2005) Ahrif skograektar a syrustig jarðvegs og grodurfar.

Age-related changes in 0-10 cm SOC



C-stock converted to CO₂ units in Ölfusvatn for ≈20 years

	CO ₂ accumulation
Soil	6,795
Trees	3,278
Litter	819
Roots	674
Vegetation	350
Total CO₂	11,912 t CO₂

What does this mean in mitigation potential?

Icelandic forests have high potential to reduce CO₂ accumulation from the atmosphere

Illustration: Toyota Yaris

- Emits ca. 99 g CO₂ km⁻¹
- For 20,000 km = 1.98 t CO₂ yr⁻¹
- **11,912 t CO₂ = 6.016 TY yr⁻¹**



Conclusion

- It is important to always include the soil in C-inventories!
 - It can store a lot of carbon!
 - If we mismanage the soil we can also loose a lot of carbon!
- National Forest Inventory is very important
 - Important to individual forest owners or companies to verify the C-sequestration in THEIR own forest with comparable methods.
 - Do whole ecosystem measurements

Project sponsors



Thank
You