

Cambium phenology of Fir, Pine and European beech along different altitudinal gradient

Presented by: Mona Nazari

Coordinator: Ptof. Dr. Heinrich Speicker

Supervisor: Dr. Dominik Stangler

Advisor: Elena Larysch

Applied Period

June-Aug_2018

Research Aims

Is there a difference in the timing of the onsets between the species?

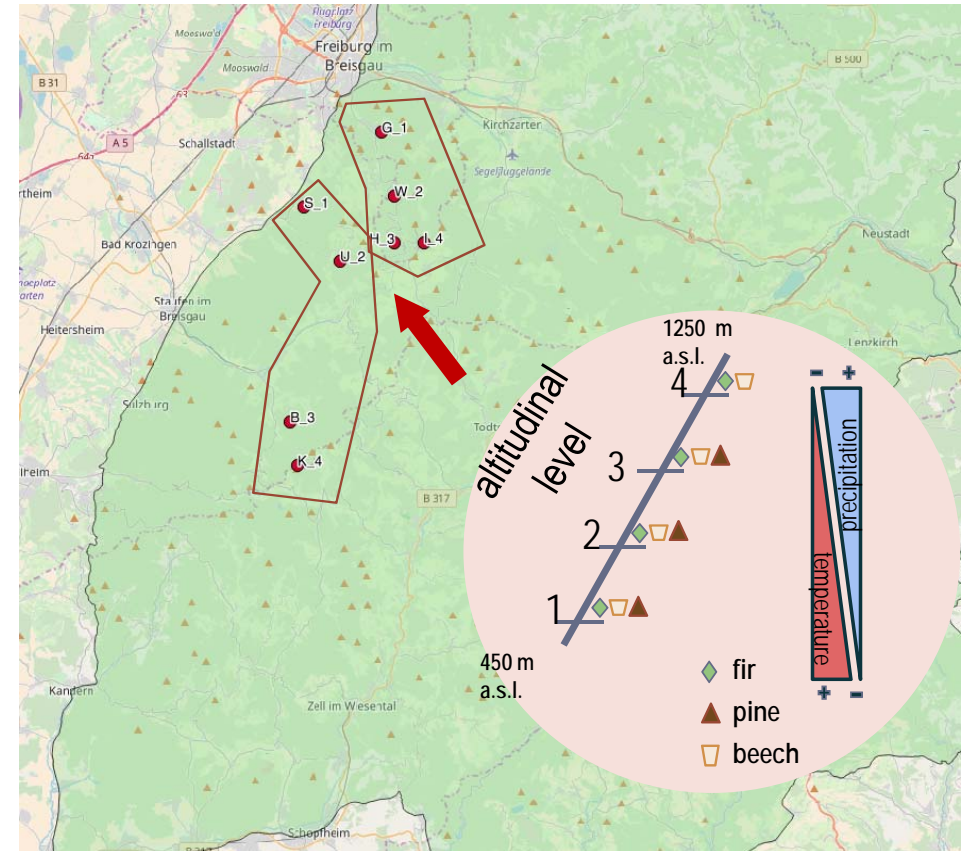
Is there a difference in the timing of the onsets along the height gradient?



Material

Location – Black Forest

Plot		Height a.s.l. (m)	Mean annual precipitation (mm)	Mean annual air temp. (°C)
Gradient 1	GUE1	450m	1123	10.2
	WOL2	675m	1532	9.4
	HOL3	950m	1716	6.8
	SIL4	1225m	1516	6.4
Gradient 2	SÖL1	475m	1221	9.5
	ULR2	700m	1312	8.9
	BEL3	875m	1465	8.2
	KEL4	1150m	1709	7.2



Material

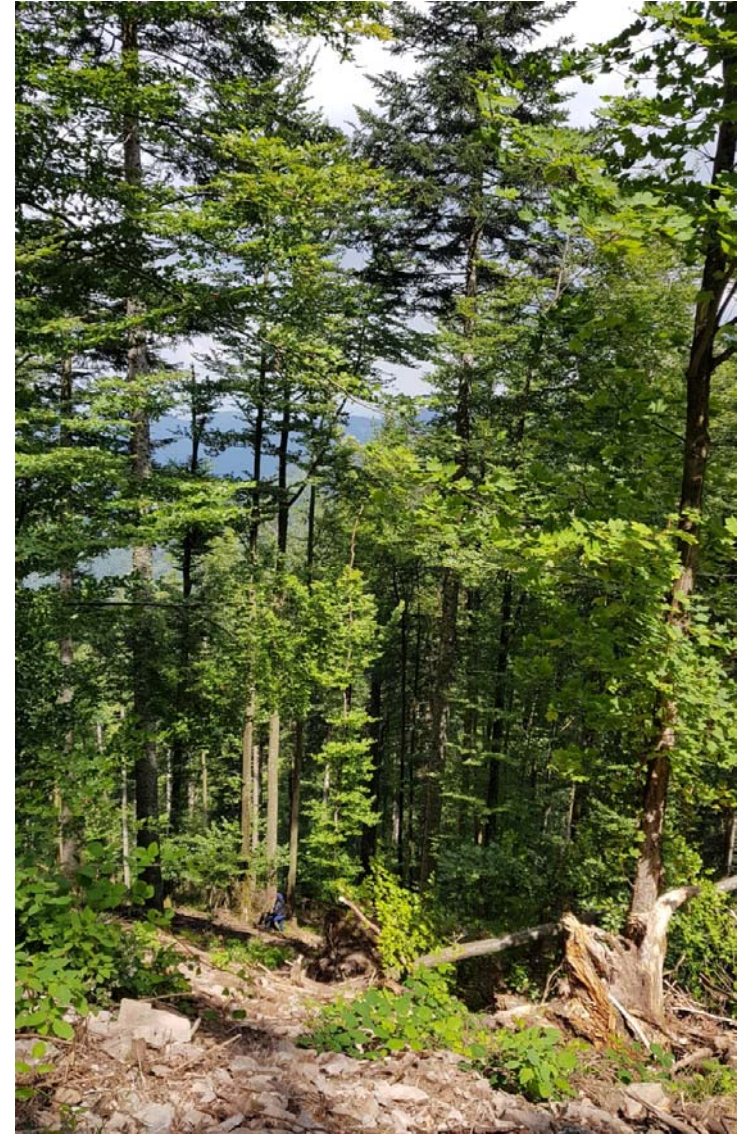
Sample collecting

- 3 tree species →
- 3 trees per species
- 8 plots with similar soil types
- 66 trees
 - Between 60 and 90 years old

Fagus sylvatica,

Abies alba

Pinus sylvestris



Method

Sampling with Trephor

- Every week up to 10 days (started on 22.03.2018)
- on breast height (2,10-2,30)
- on the left and right side of the trunk (Perpendicular (90 degrees)to the slope direction)
- The microcores were stored in 50% Ethanol /Aqua dest.Solution in the fridge



Method

Preparation of microcores to thin section

- Preparation for embedding
 - Dehydrate the microcores
- Infiltrate the microcores with Technovit
- Embedding
- Microtome - making thin sections

CHANGE LEVEL
AGITATION
VACUUM



Method

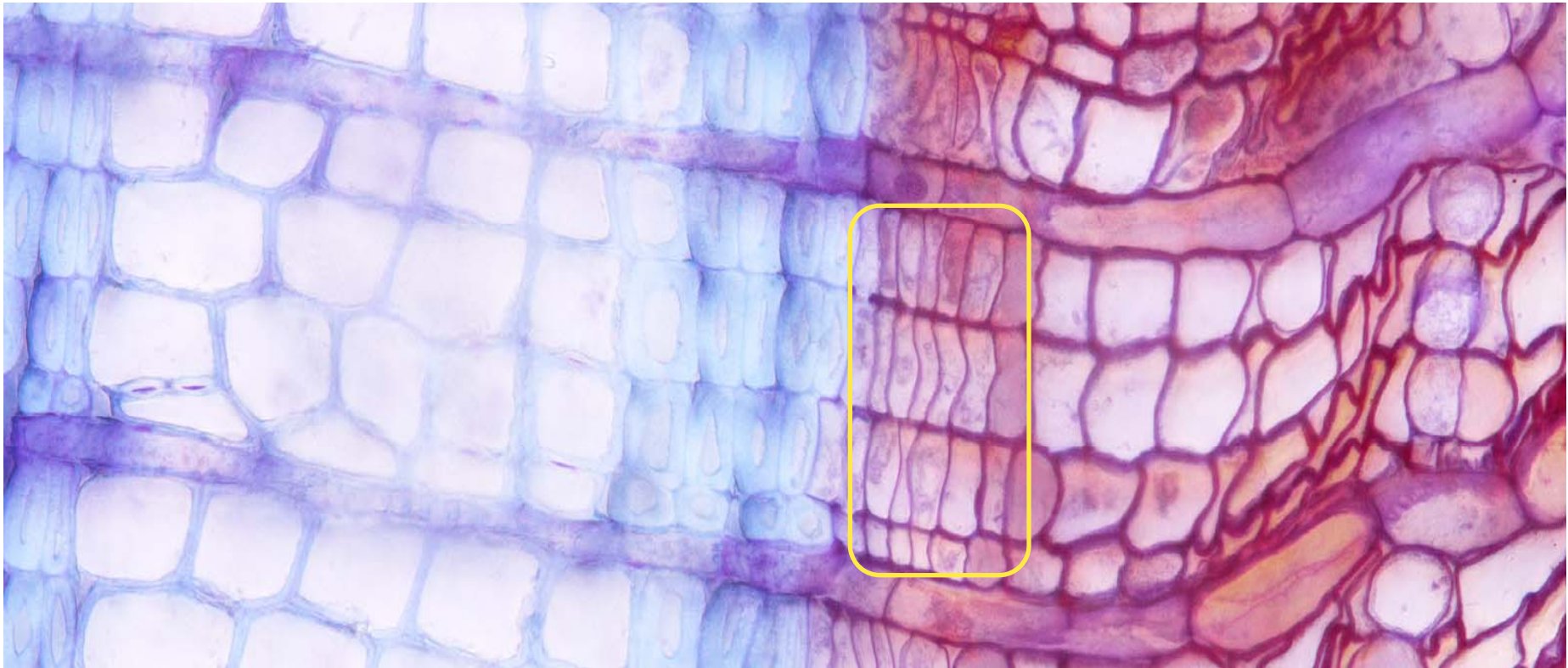
Thin section

- Finding fiber direction
- Cutting by microtome (10-15 μm)
- Stain with cresyl violet (3-5 minutes)
- Top the thin section with glycerol



Result

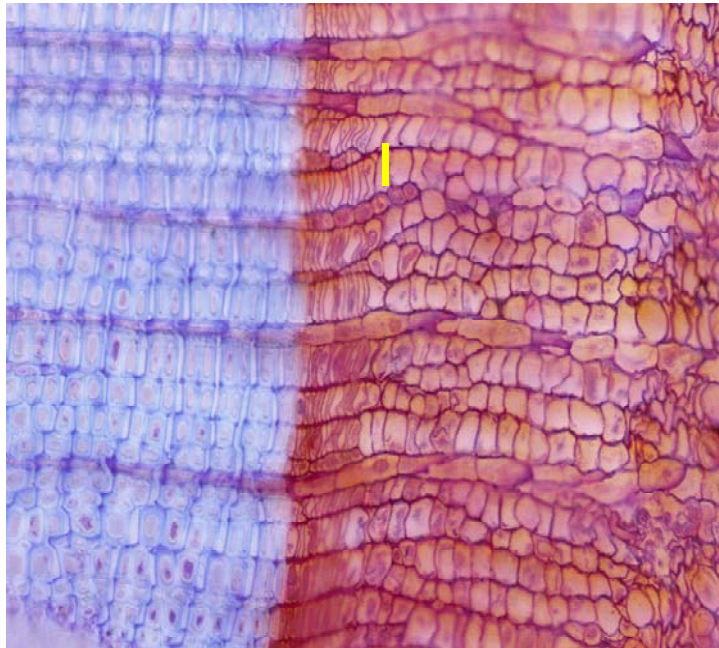
Cambium Cells



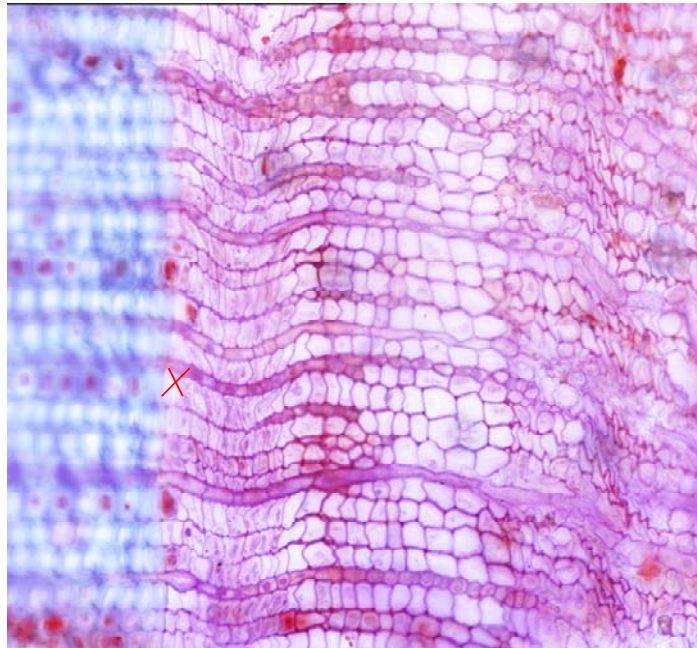
Result

Cambium activity in *Abies alba*

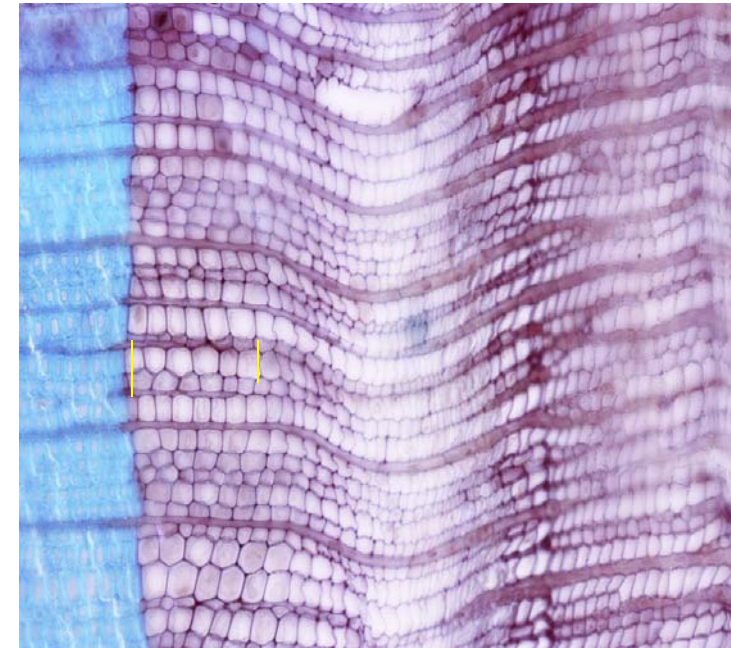
1) Phloem Enlargement cells



2) Xylem Enlargement cells



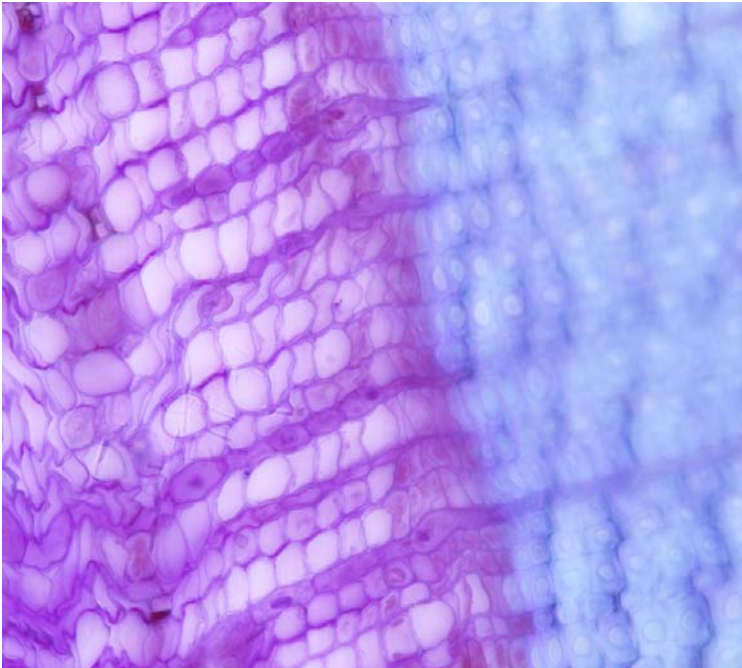
3) Developing secondary cell wall



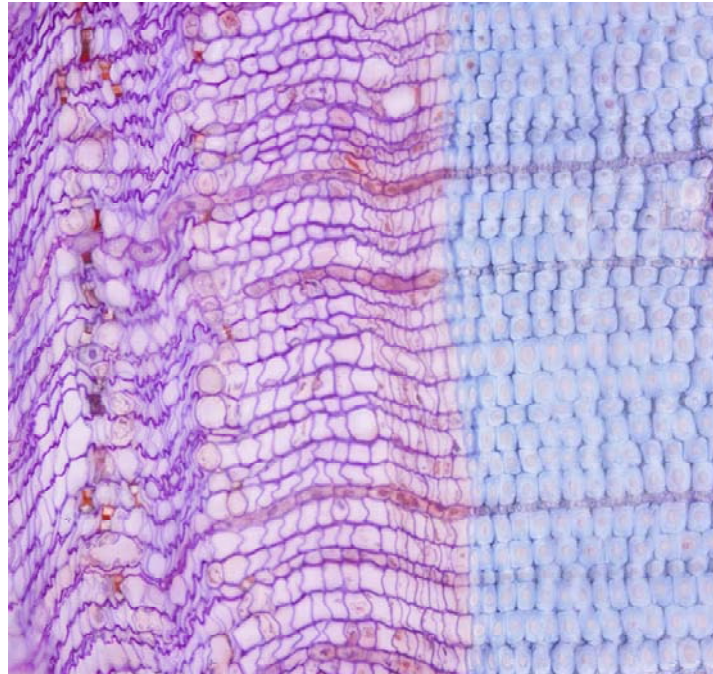
Result

Cambium activity in *Pinus sylvestris*

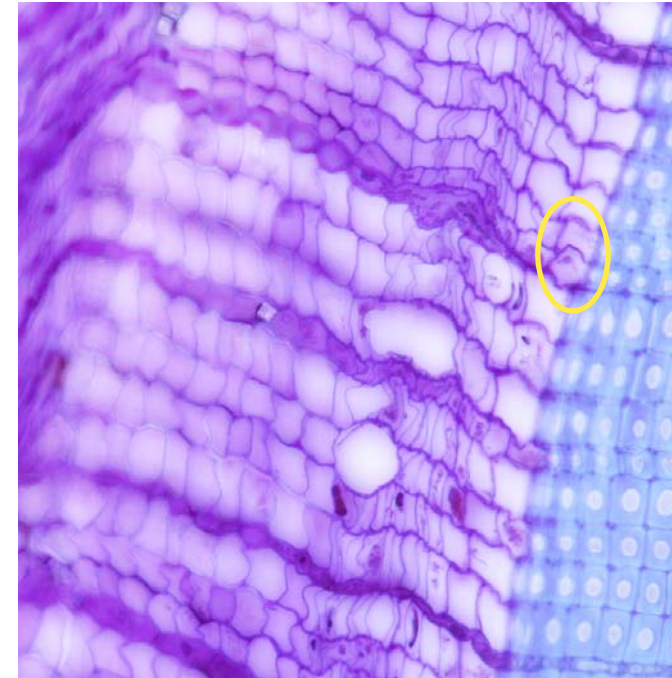
1) Phloem Enlargment cells



2) Xylem Enlargment cells



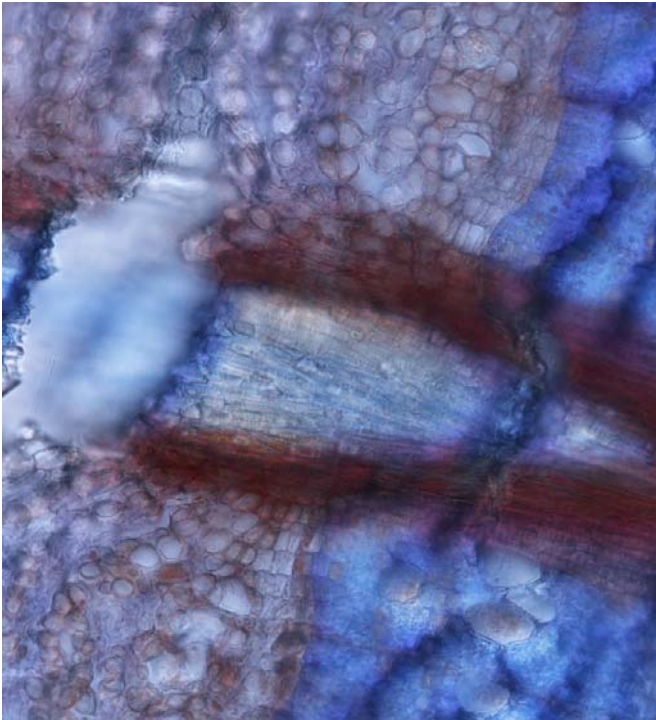
3) Developing secondary cell wall



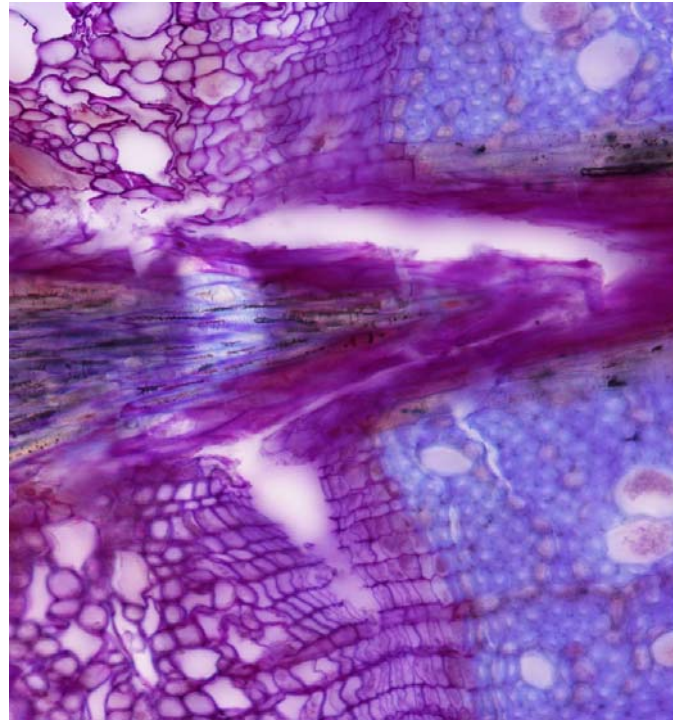
Result

Cambium activity in *Fagus sylvatica*

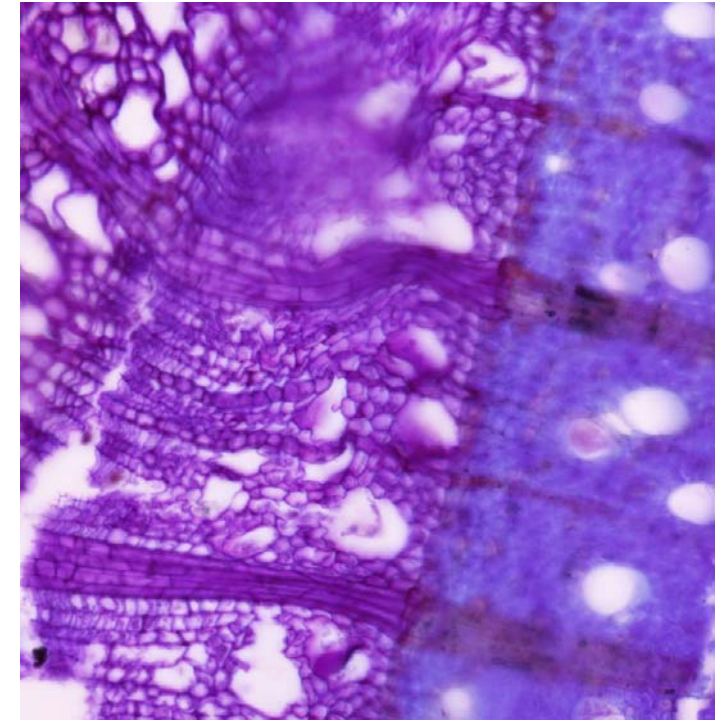
1) Phloem Enlargment cells



2) Xylem Enlargement cells



3) Developing secondary cell wall

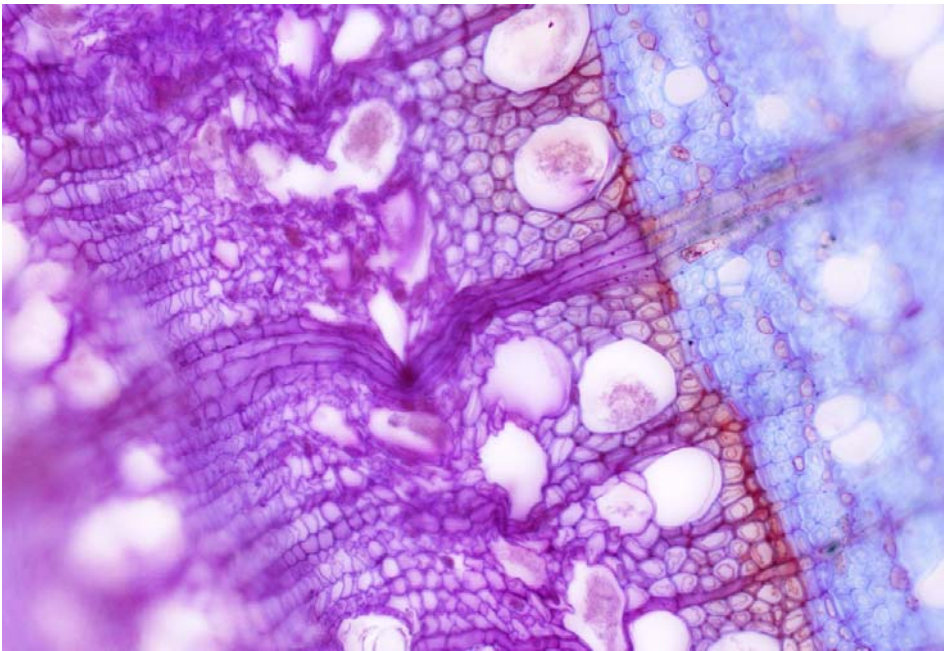


Result

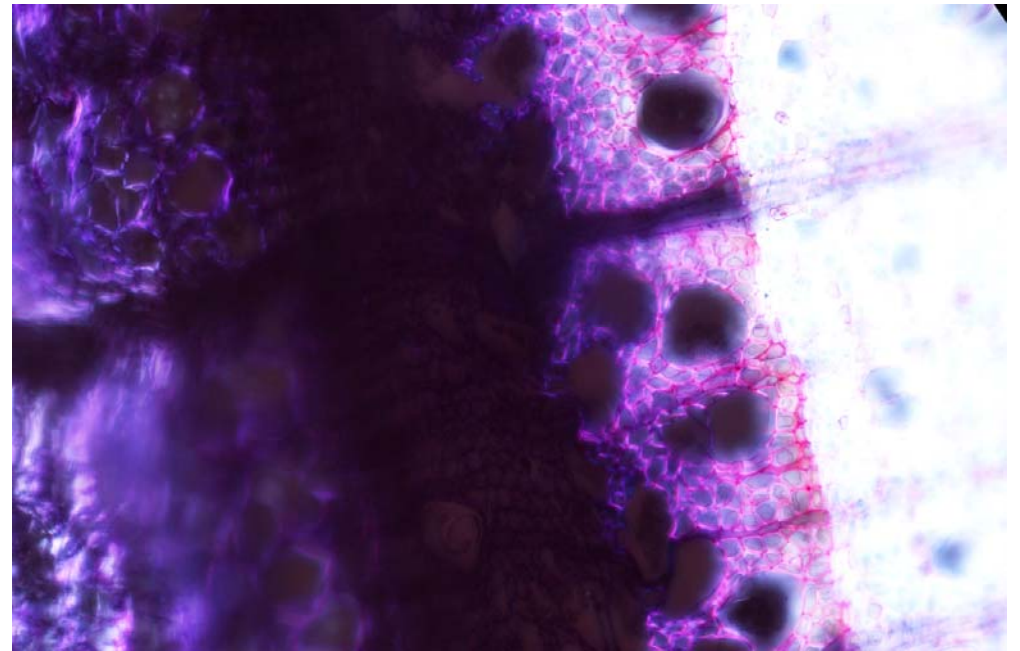
Cambium activity

Secondary cell wall → wall thickening cells (mature cells → no more expanding)

Normal picture

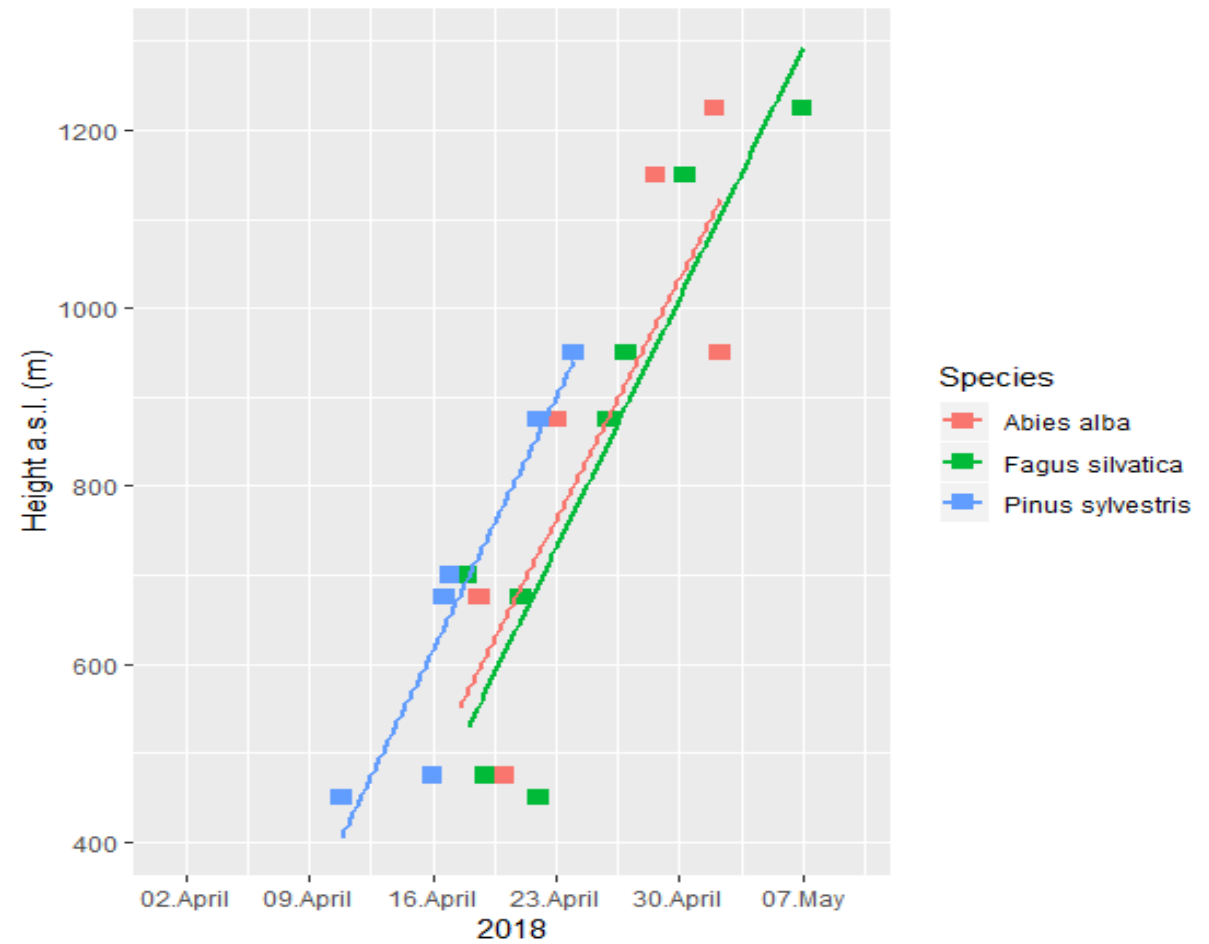
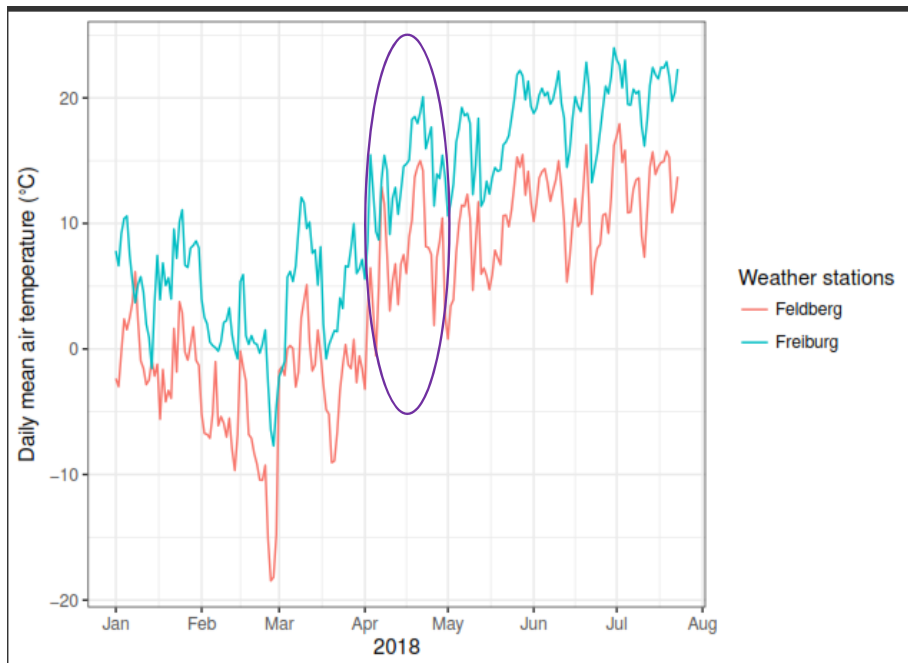


Polarized light picture



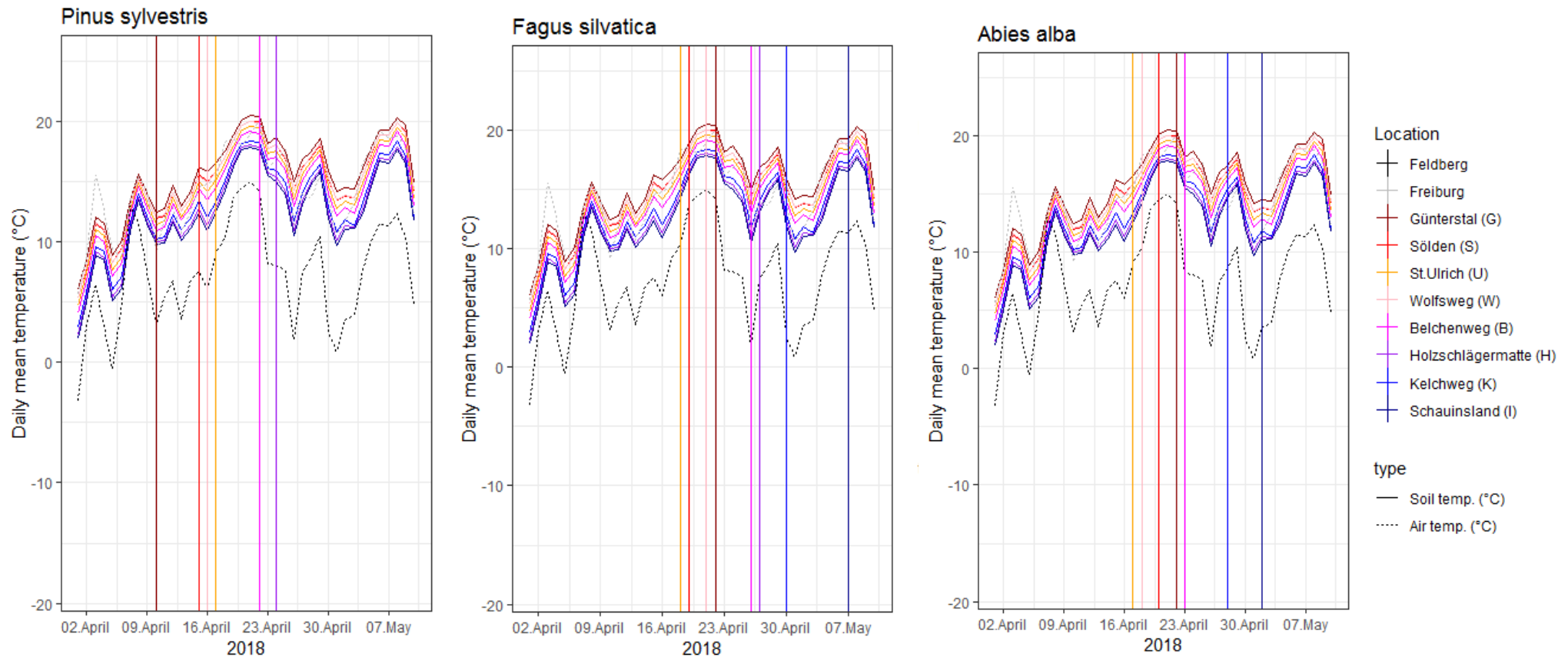
Result

Onset of cambial activity in the 3 species



Result

onset of radial growth along the height gradient



Outlook

- Whether adaptation can be effective on onset of radial growth considering climate change or not?

Thank you for your attention
