MSc European Forestry
Applied Period June – August 2019

Wood Formation And Tree Growth Phenology Of *Abies alba* And *Pinus syslvestris* Along Altitudinal Gradient In The Black Forest

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THE CLIMATE IS CHANGING

DENDROECOLOGICAL RESEARCH

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Project information

2

Field Work

3

Microcore Measurement

4

Data Analysis

5

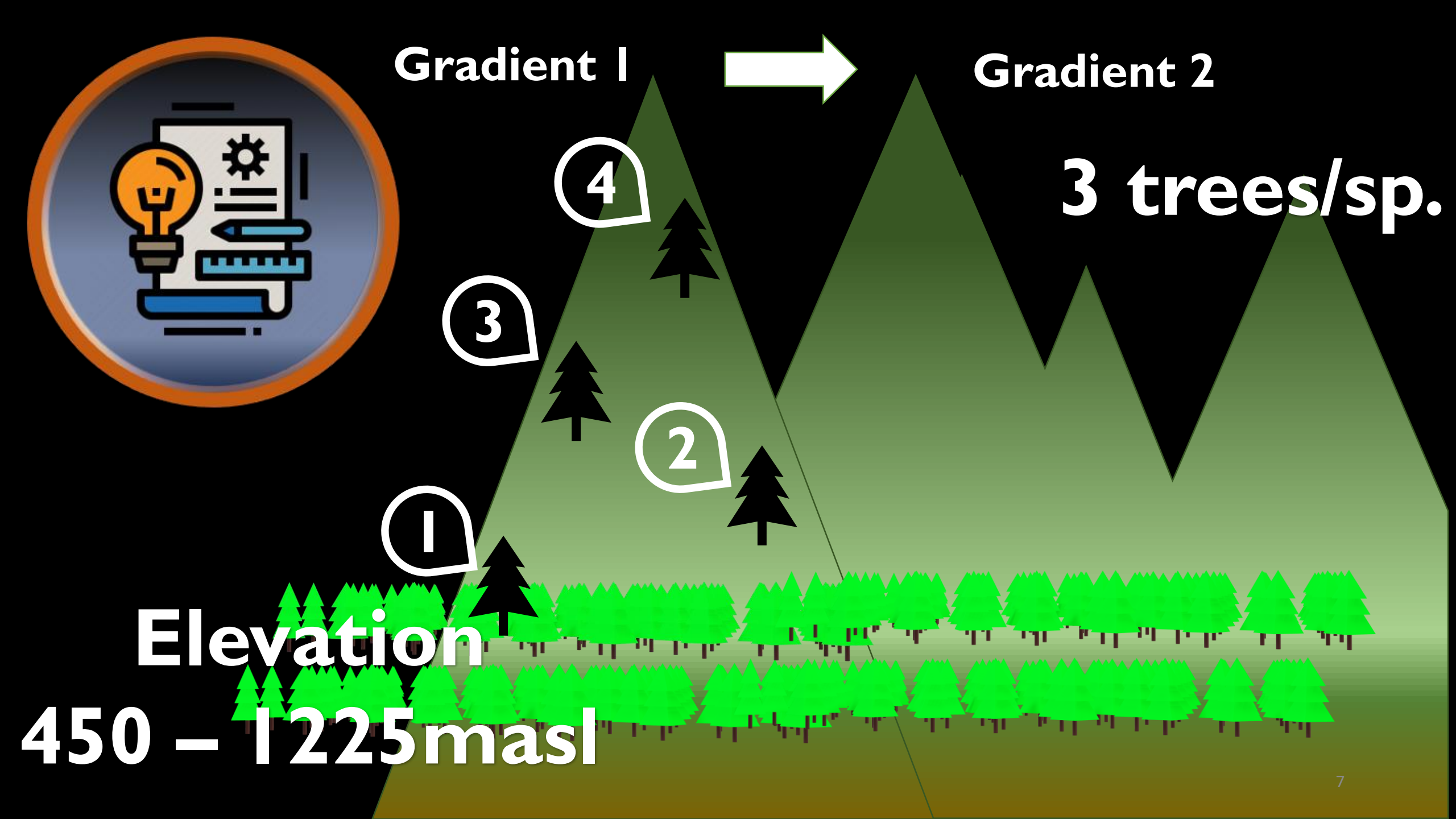
Conclusion

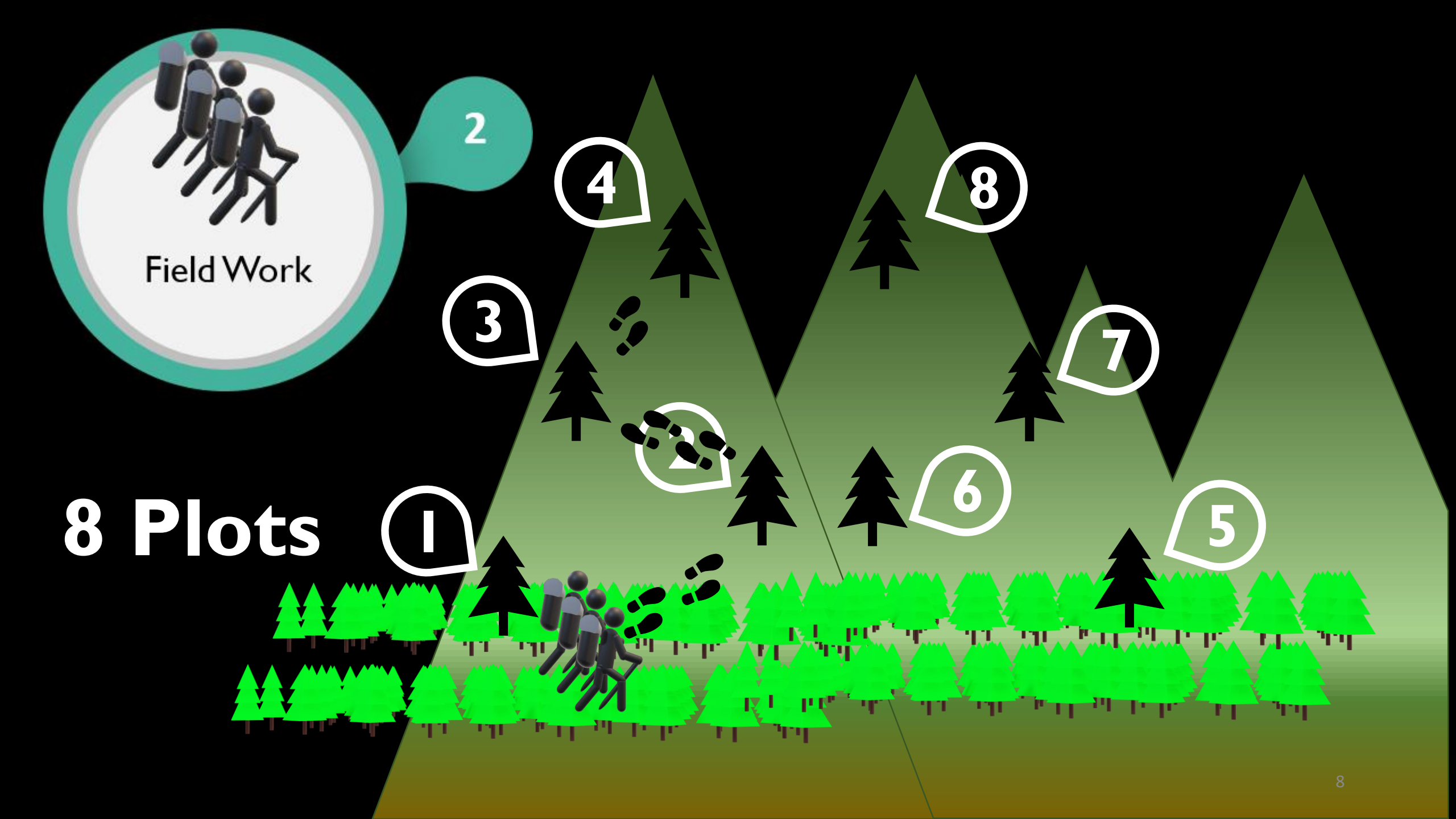
1

Project information

Pinus sylvestris

Abies alba


Gradient 1
Gradient 2
3 trees/sp.
4
3
2
1
Elevation
450 – 1225masl

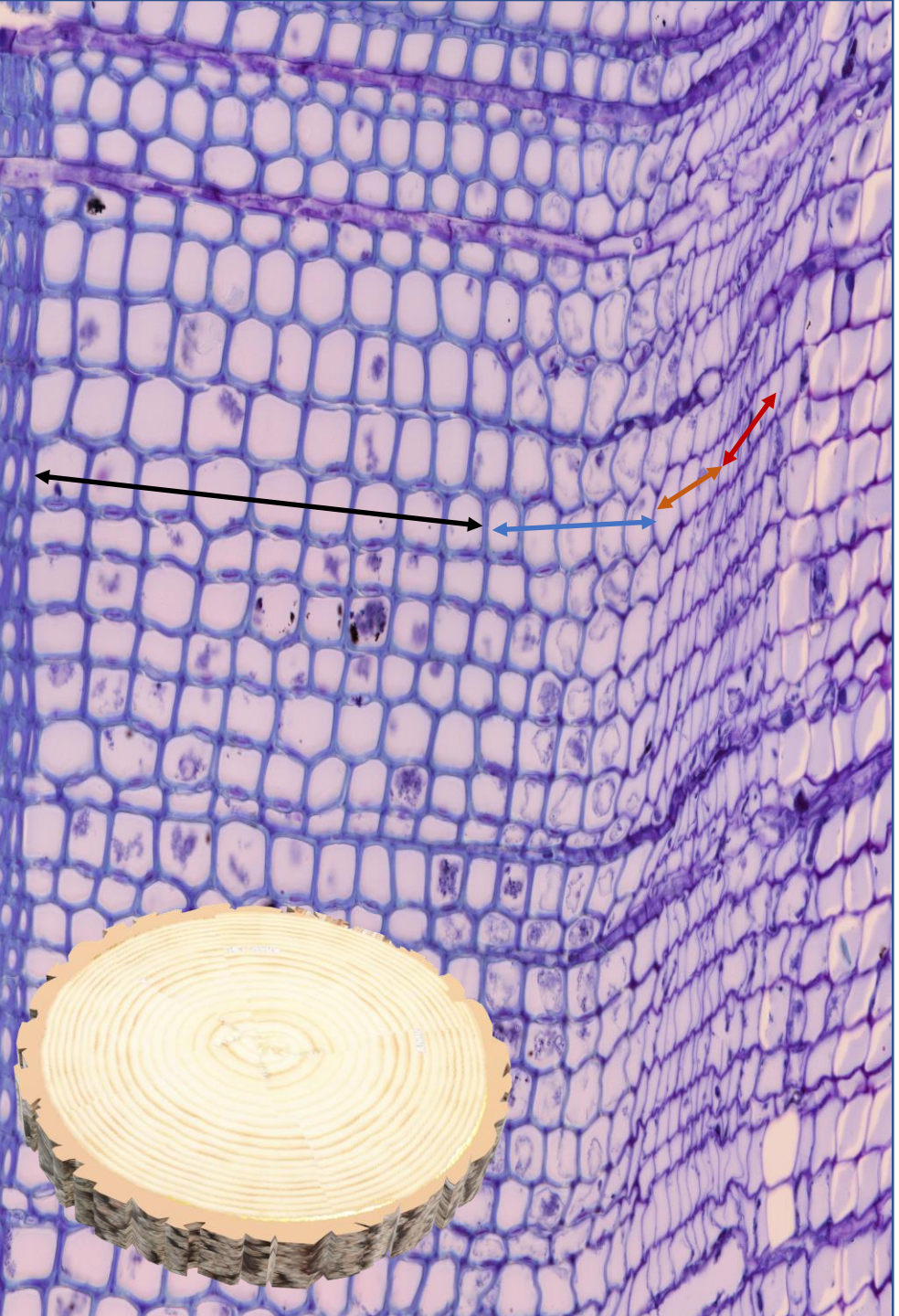


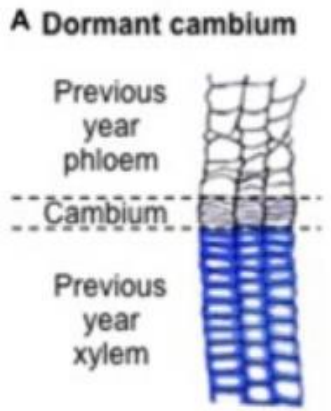
8 Plots

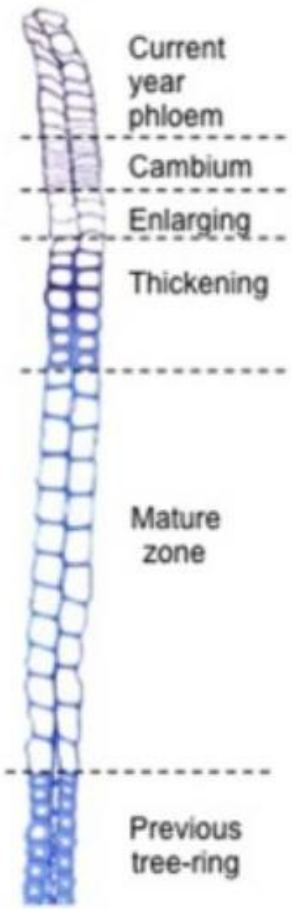
Increment core

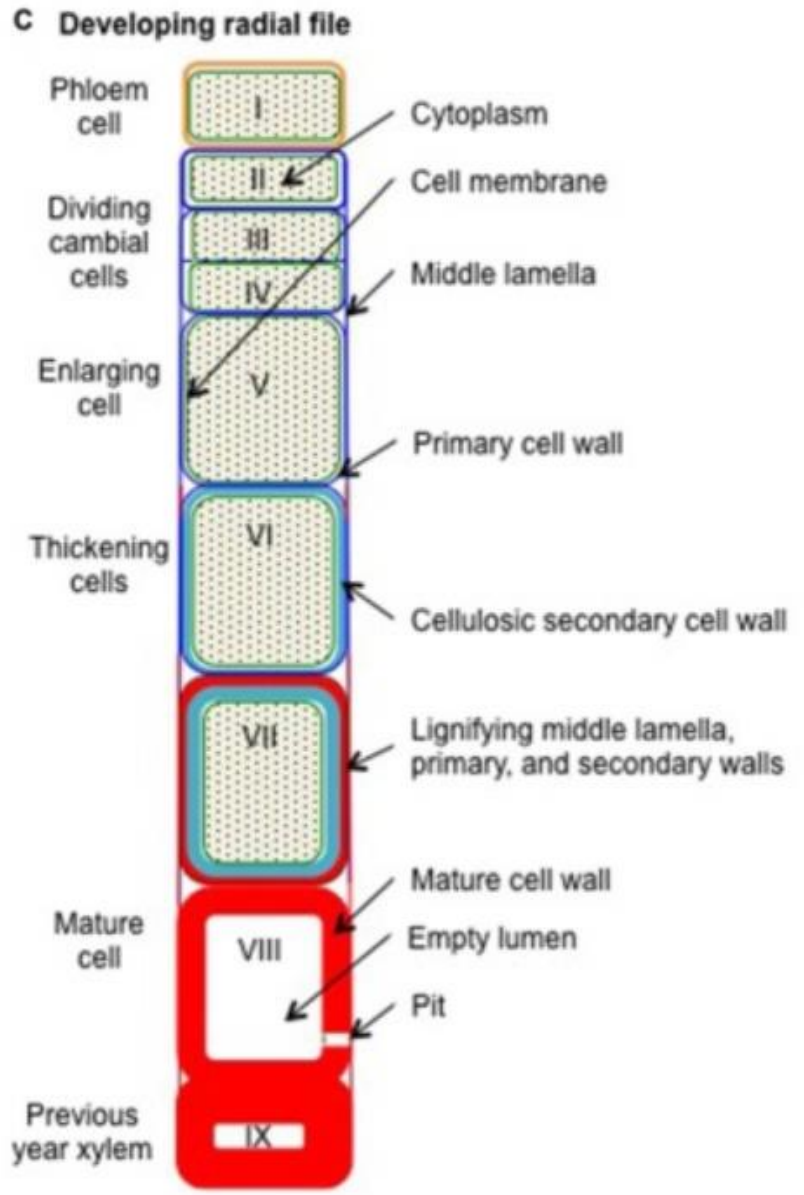
Microcore

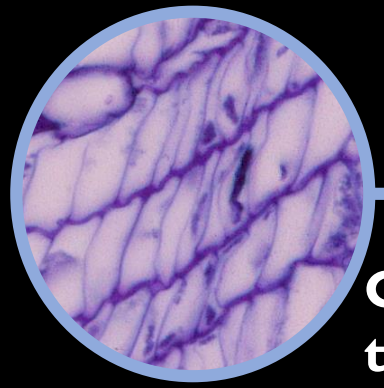
Microcores collection



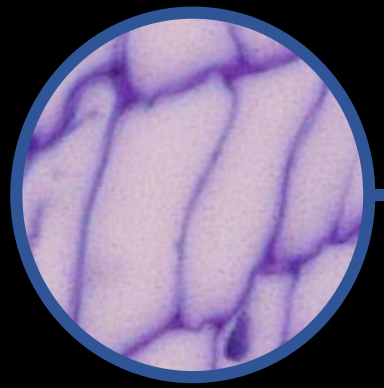

A Dormant cambium
Previous year phloem
Cambium
Previous year xylem


B Active cambium
Current year phloem
Cambium
Enlarging
Thickening
Mature zone
Previous tree-ring

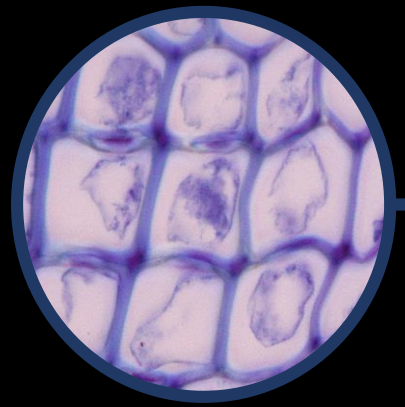

C Developing radial file
Phloem cell
Dividing cambial cells
Enlarging cell
Thickening cells
Mature cell
Previous year xylem
I
II
III
IV
V
VI
VII
VIII
IX
Cytoplasm
Cell membrane
Middle lamella
Primary cell wall
Cellulosic secondary cell wall
Lignifying middle lamella, primary, and secondary walls
Mature cell wall
Empty lumen
Pit



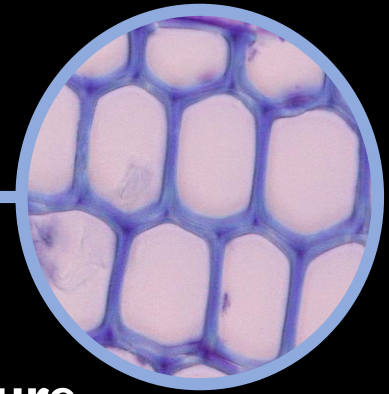
Cambial cells – thin cell walls and small radial diameters



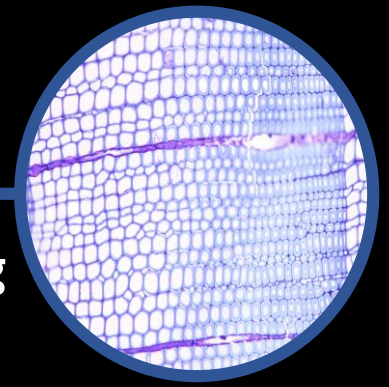
Enlarging cells – larger than cambial cells and had thin walls that were not birefringent under polarized light



Microcore Measurement



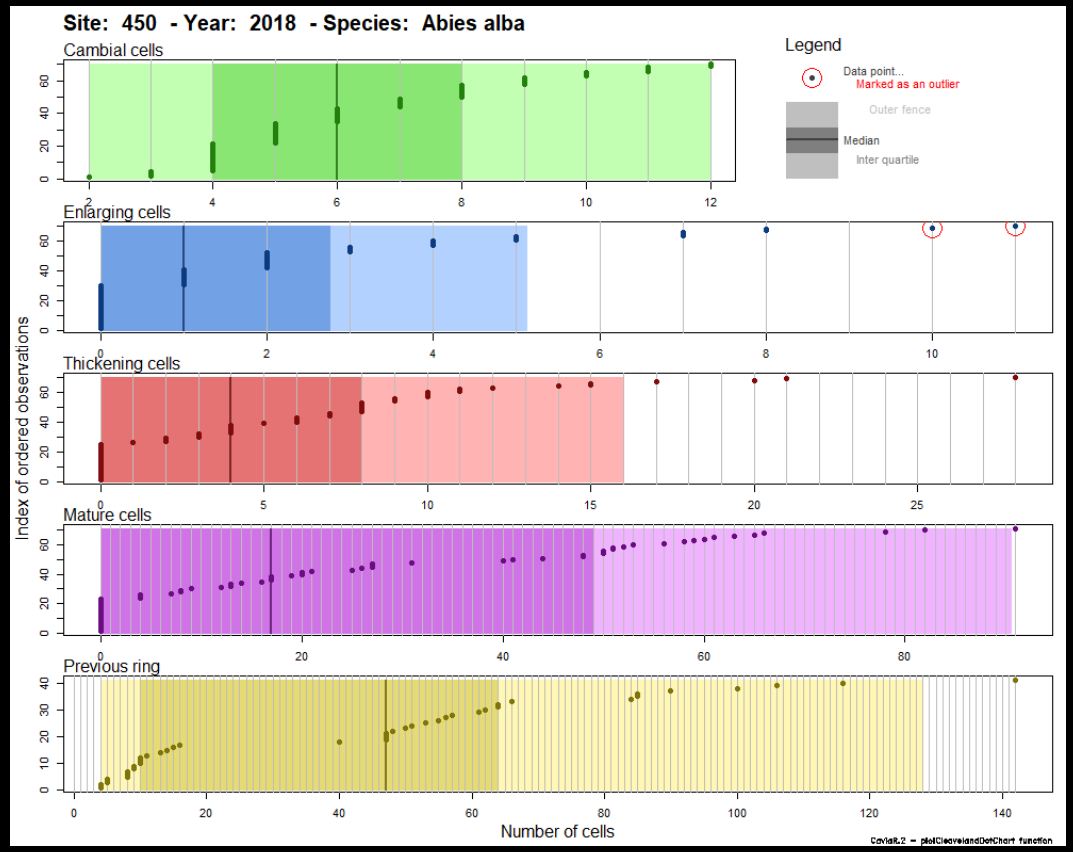
Mature cells – Tracheids were considered mature when walls were completely blue.

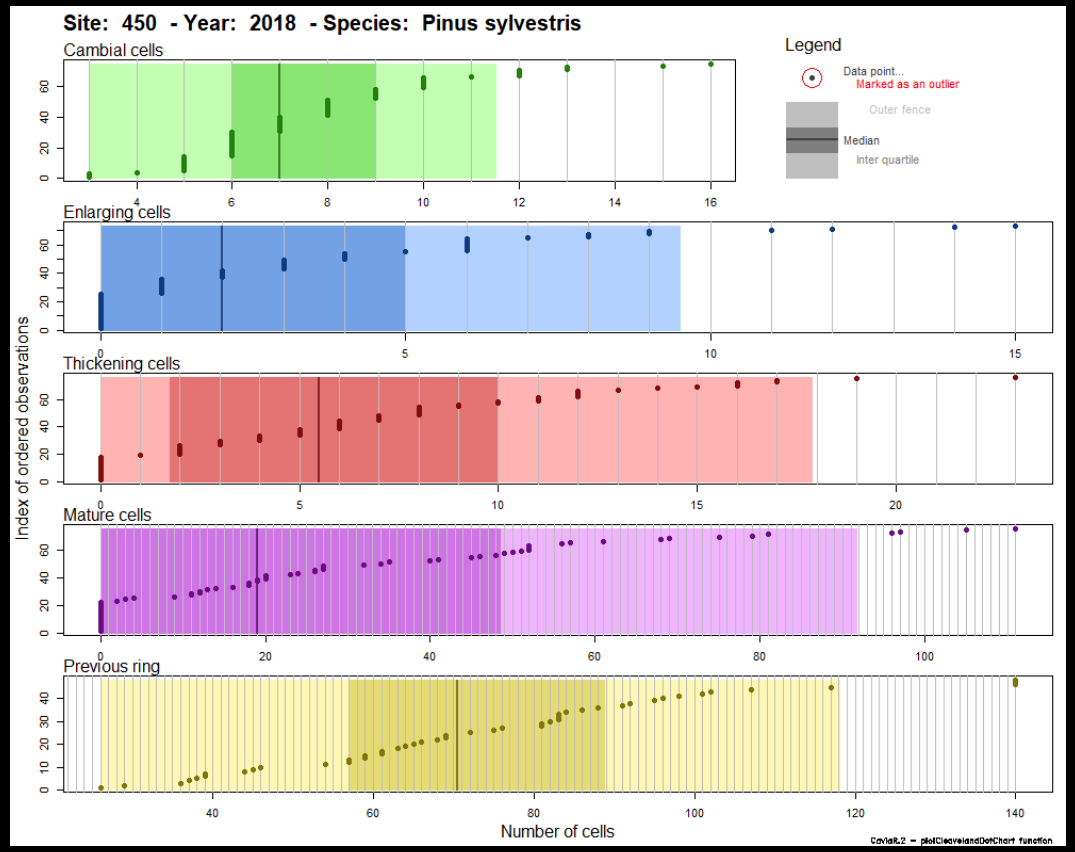


Previous tree ring

Cell-wall thickening and lignifying cells were birefringent under polarized light and demonstrated violet and blue walls

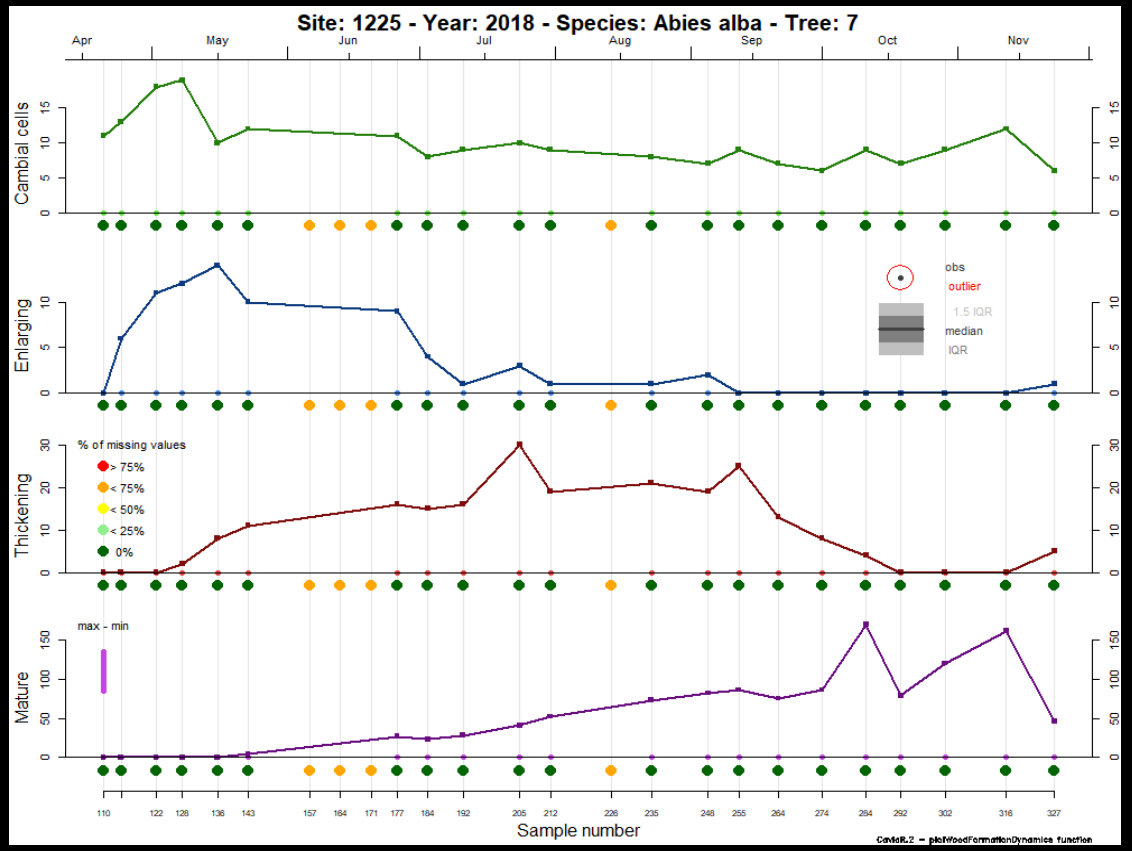
- **CAVIAR – R Package**

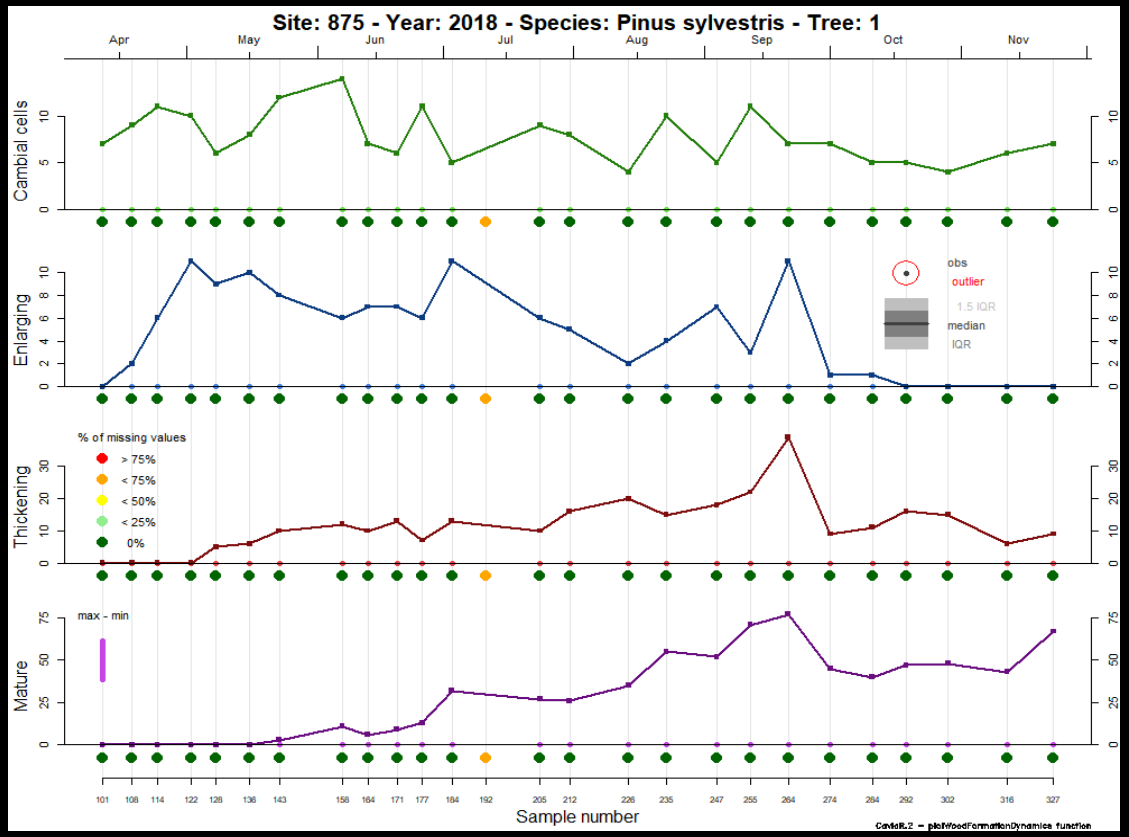




Detecting errors in the dataset

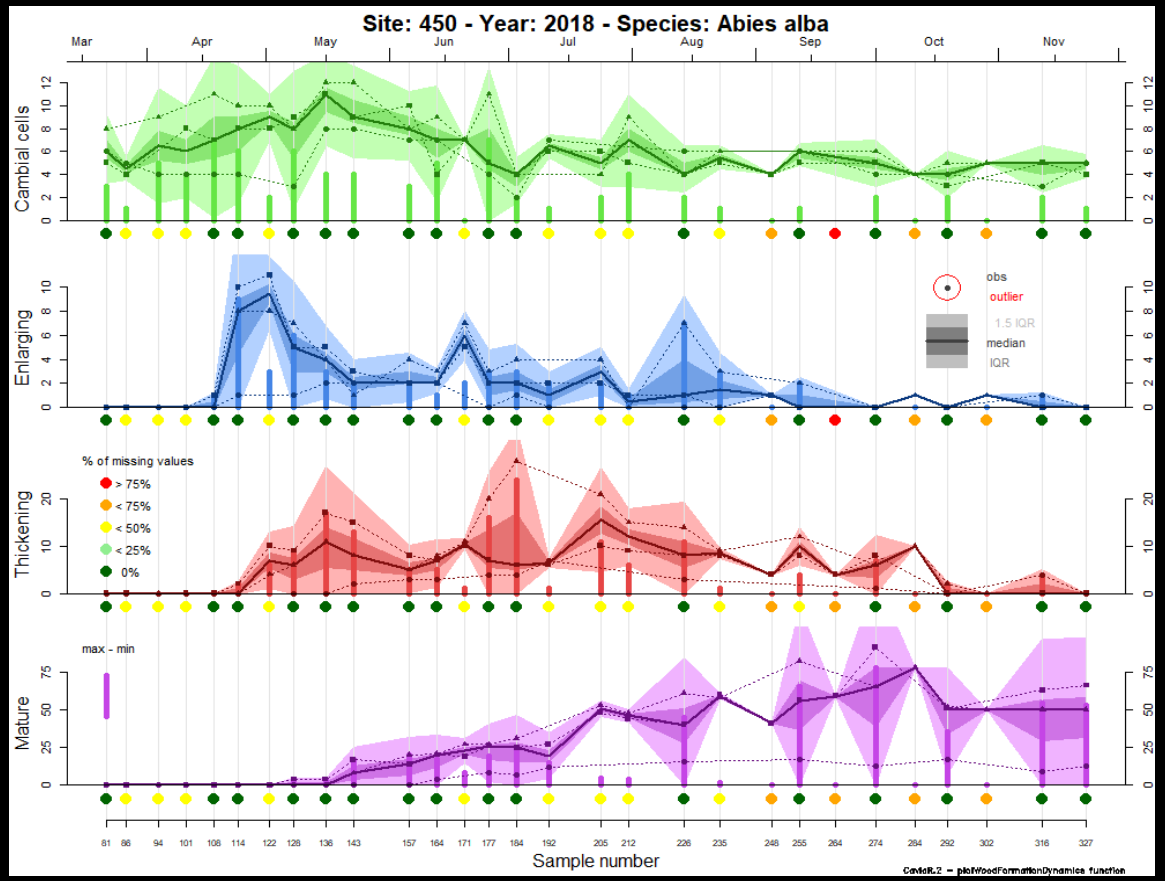
detect basic errors in data encoding, recording and transfer

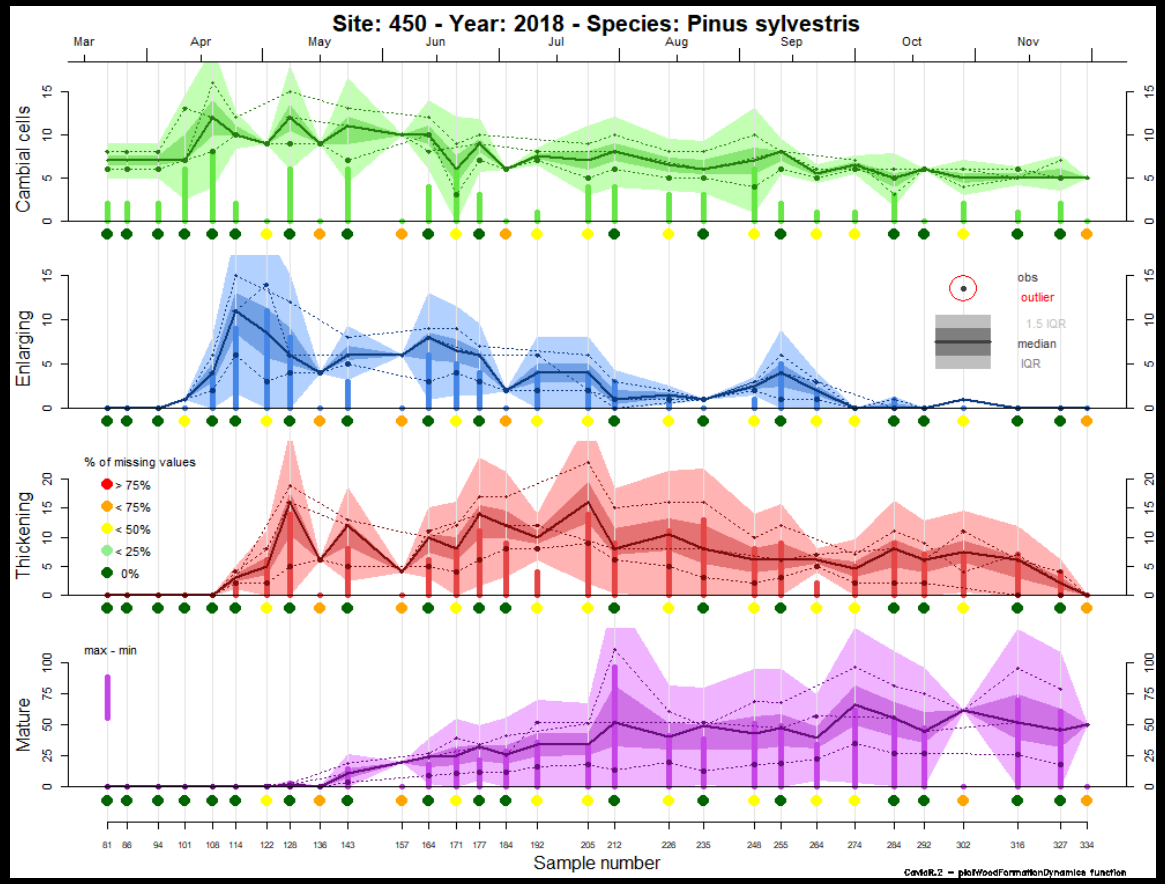




Detecting outliers at the radial file level

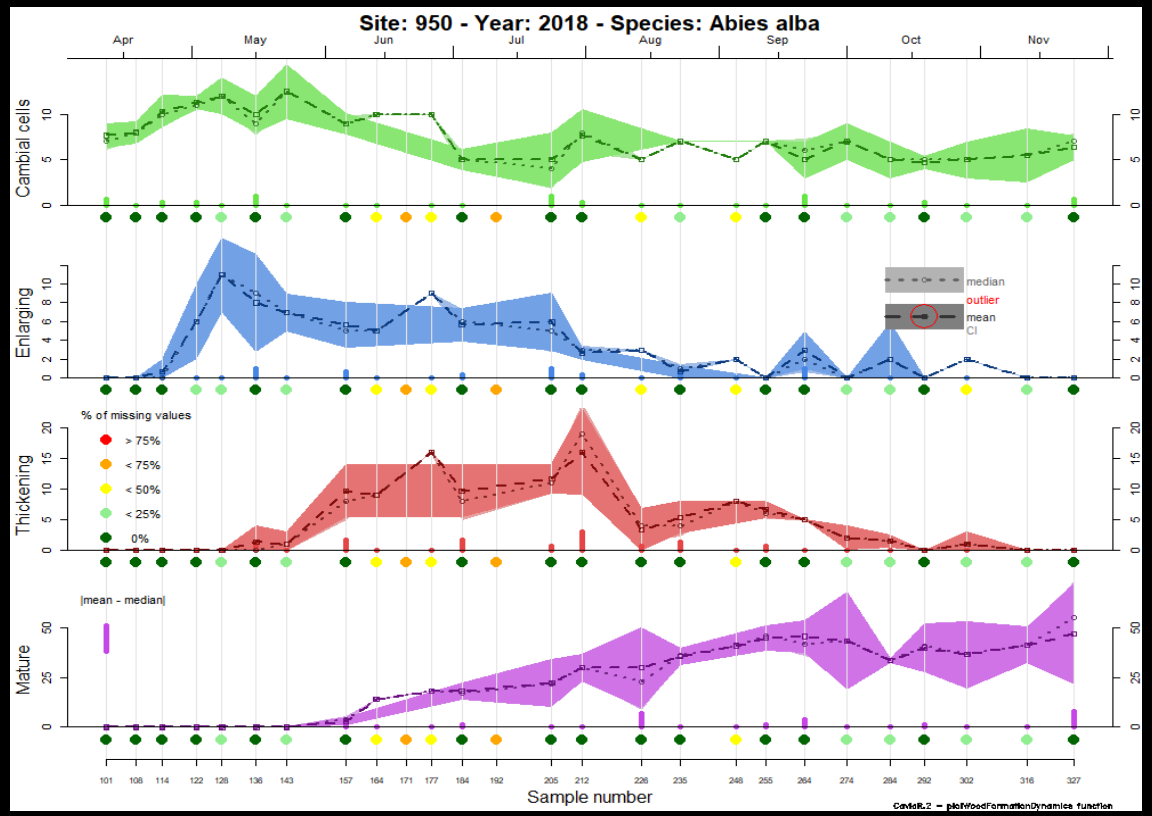
difference between raw cell counts of different radial files from the same tree

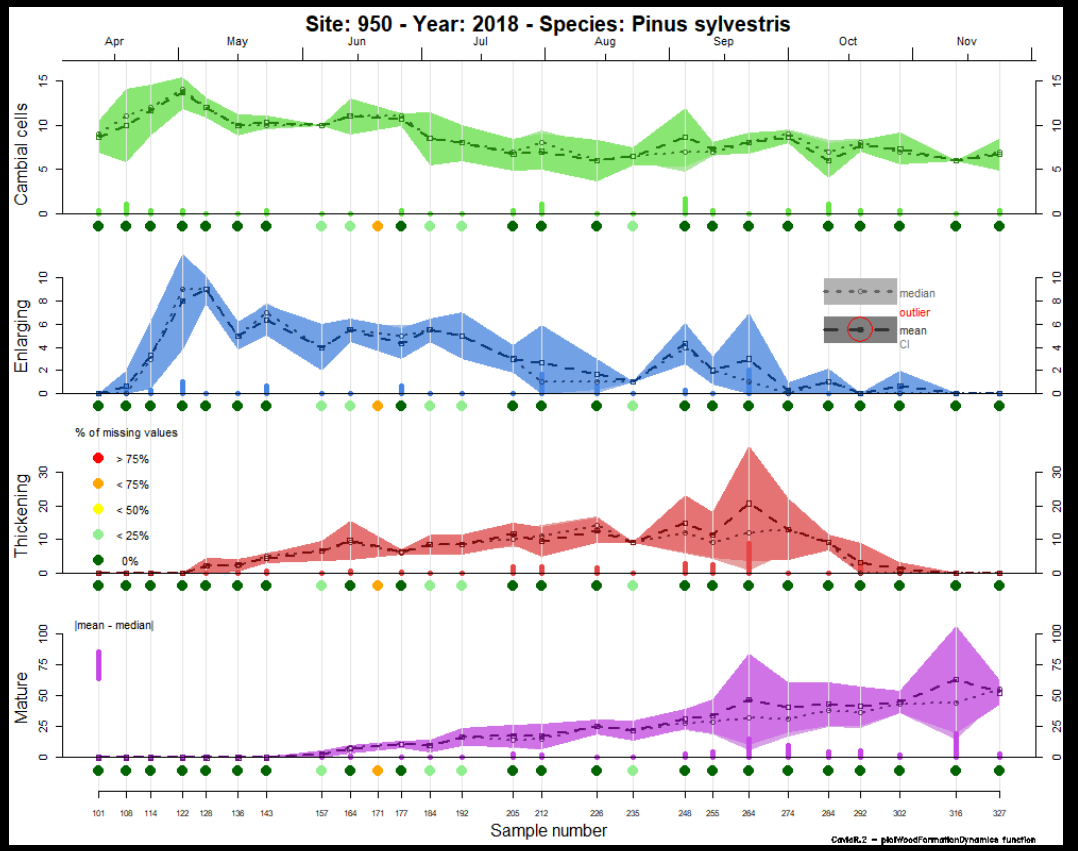




Detecting outliers at the tree level

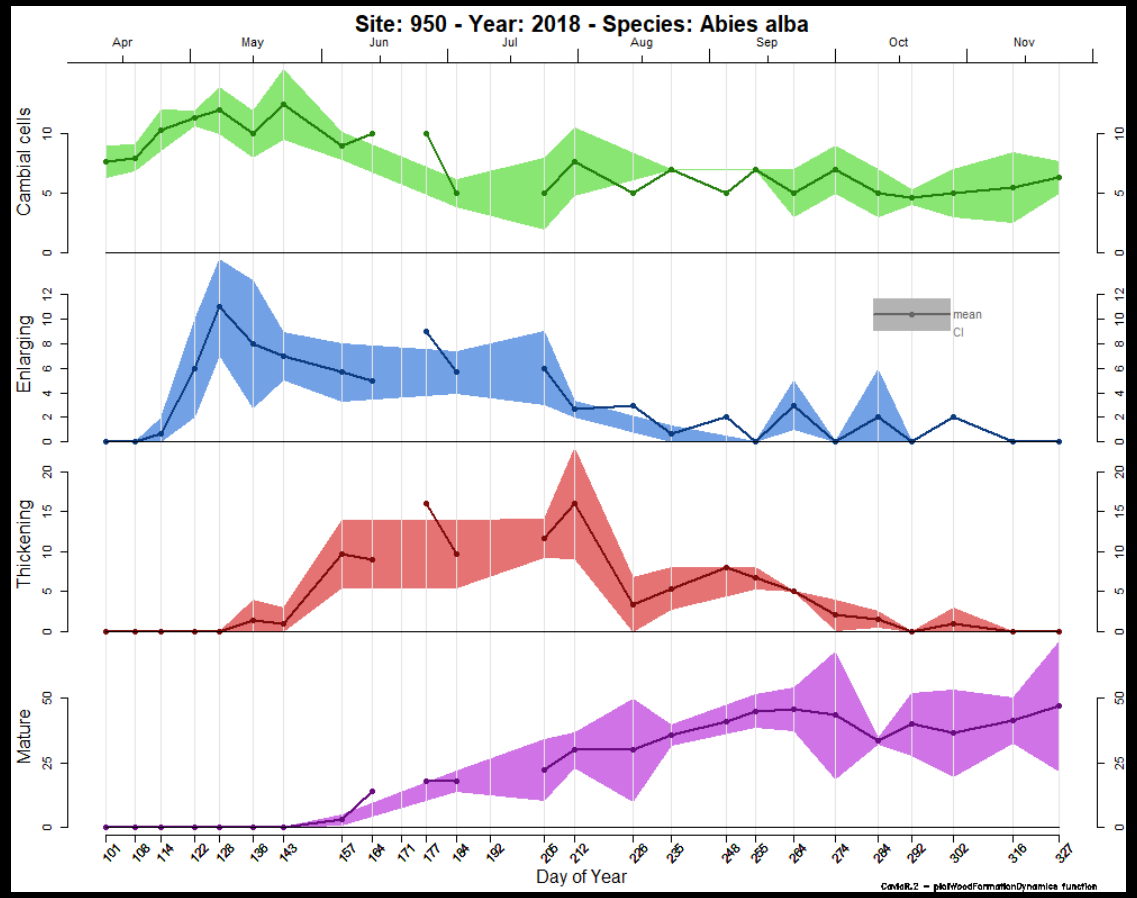
difference between the behaviours of different trees from the same group

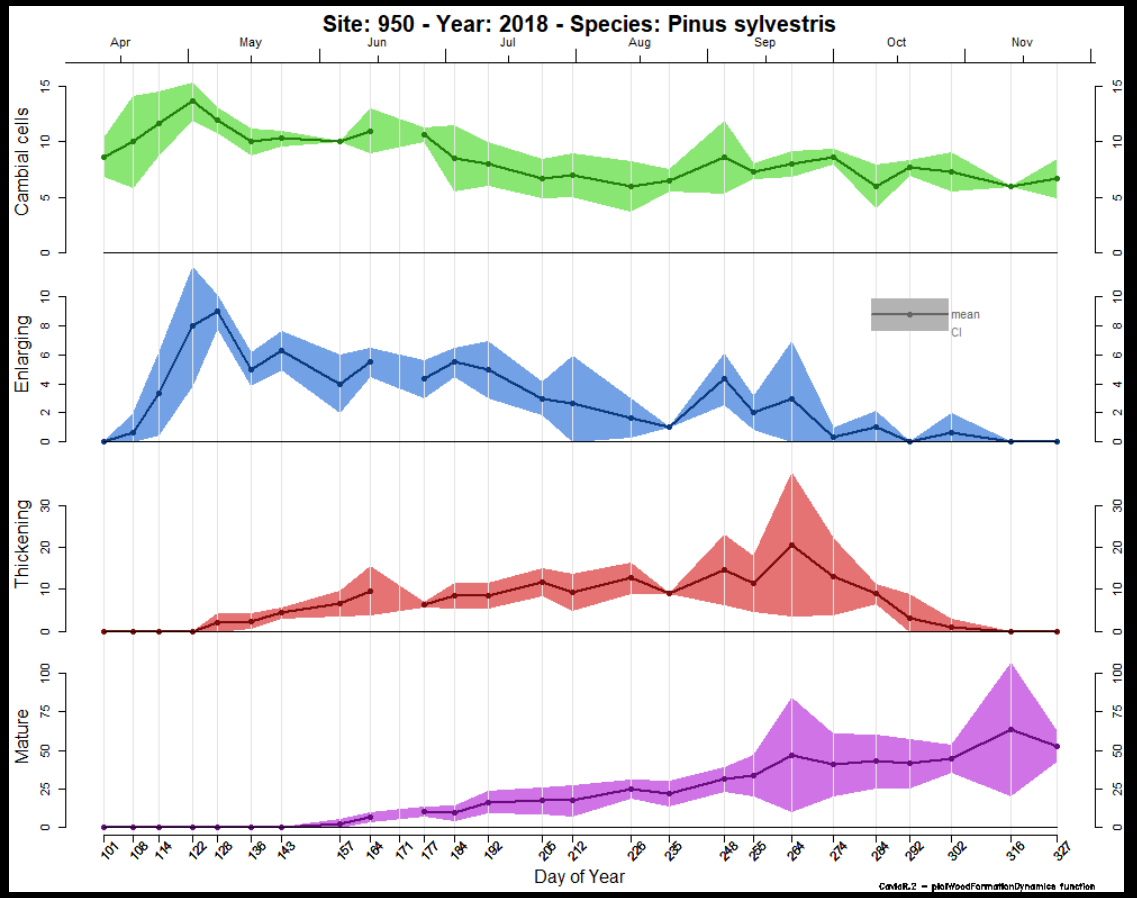




Assessing group consistency

comparing the central tendencies (mean vs median) of tree groups

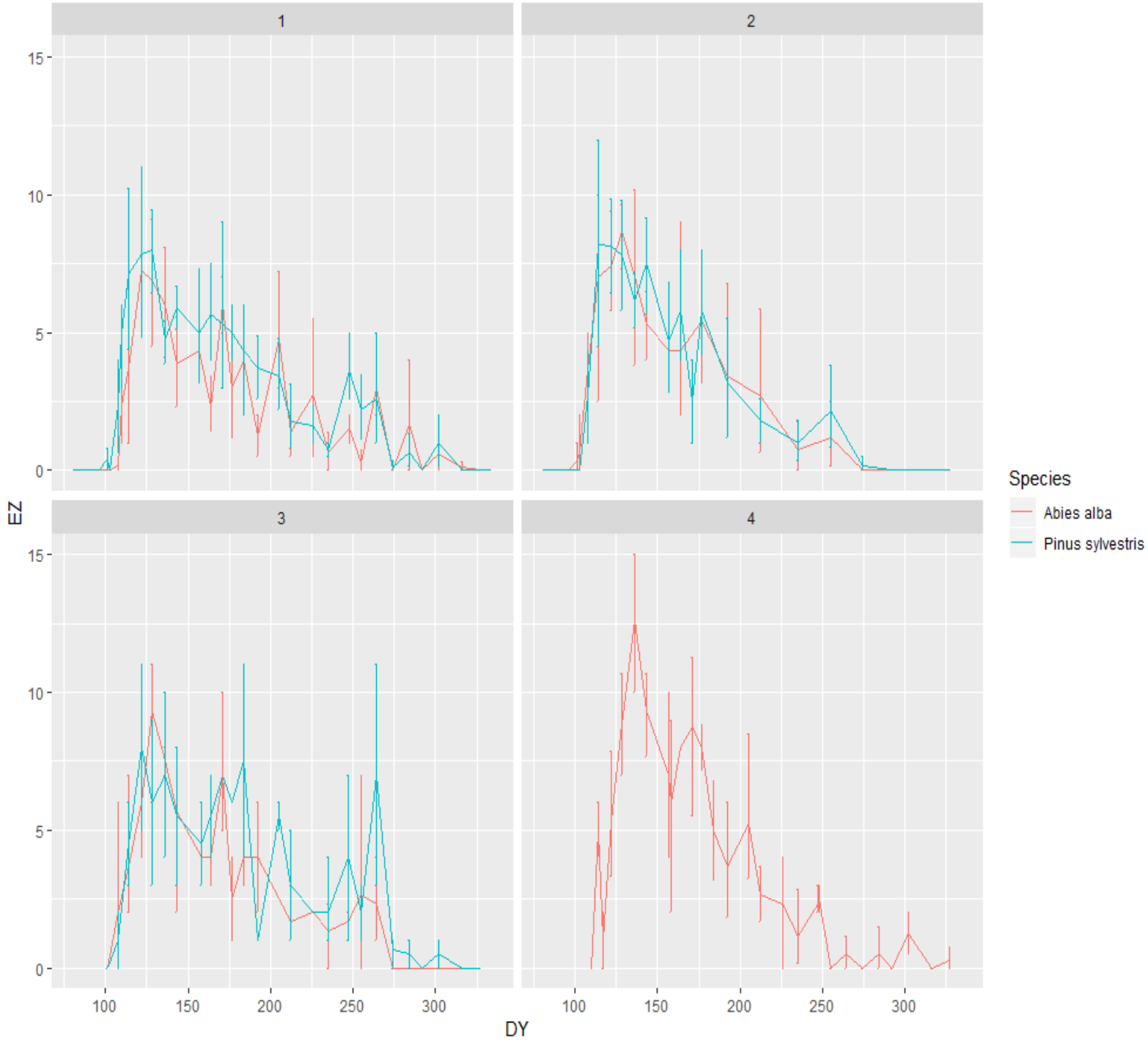




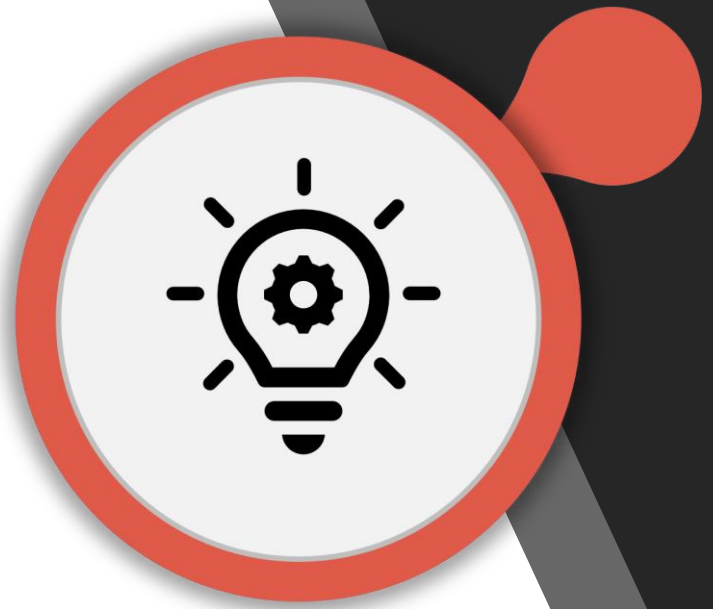
Final display of the group trend

plots the median or the mean cell counts for each selected group

Multi-panel graph: Cell differentiation phases along the 4 elevations



CONCLUSION



- Research in Dendroecology provide new possibilities for a **better understanding** of the mechanisms related to plant growth–environment interactions and better deciphers the information retained in tree-rings.
- Data cleaning and checking – **completeness of data**
  - There are problems with bad quality pictures and broken samples
- Intensive monitoring of tree samples is needed to have an adequate information on cambium dynamics
- Recommendation based on the challenges
  - Sharp Trephor to have less problem in the quality of the sample/picture
  - Larger hammer when collecting microcores (getting rid of breaking the sample)
  - CAVIAR – R Package = Naming in Excel/Methods used

In the coming weeks…

THANK YOU FOR YOUR TIME

Do you have any Questions?

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