

Investigation of tree growth and wood properties by means of X-ray computed tomography

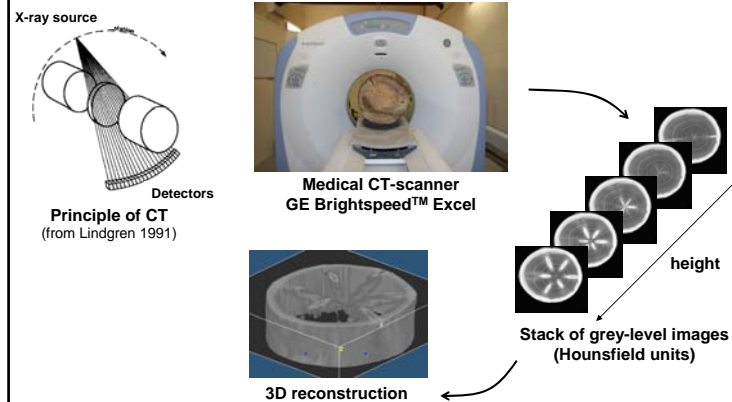
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Materials

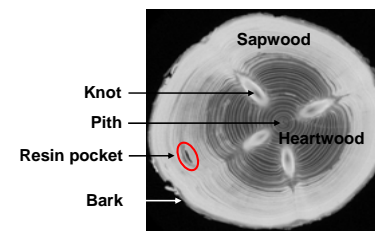
At the LERFoB lab : 2 devices based on X-ray computed tomography (CT)

- **1 micro-scanner**
max transversal resolution = 10 $\mu\text{m}/\text{pixel}$;
max axial resolution = 10 μm
More precise
- **1 medical CT-scanner**
max transversal resolution = 0.2 mm/pixel;
max axial resolution = 0.625 mm
Faster → Acquisition of images at high-speed

Device and raw data obtained via the medical CT-scanner

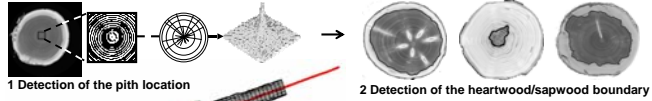


Wood characteristics visible on CT-images of *Picea abies* (L.) Karst. scanned at fresh state



Within- and between-tree variations of the amount of conducting sapwood in *Picea abies*

Data acquisition: algorithms for automatic image processing:



3D reconstruction

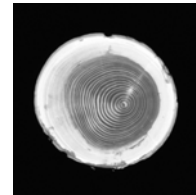
Example of obtained results:

- **within-tree level:**
 - Constant sapwood width (SW) along the stem
 - Decrease of 52% of the sapwood area between 1.30 m and crown base
 - **between-tree level:**
 - Bigger SW for dominant and co-dominant trees
 - Bigger SW for young stands and less dense stands
 - Correlation between SW and the amount of living branches
- Contradiction to the pipe model

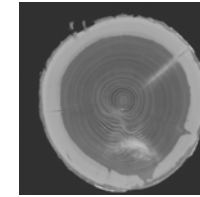
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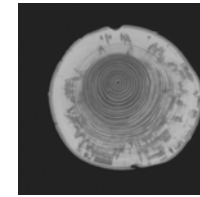
Observation of other wood characteristics of *Picea abies*



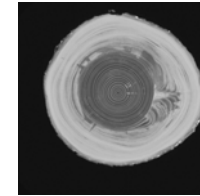
Eccentricity and related compression wood



wound ?



Decay ?

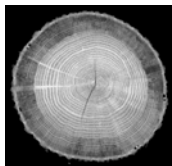


wound

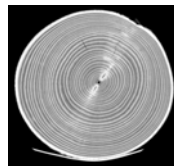
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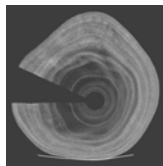
Other species with various moisture content



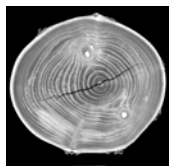
Quercus robur L.



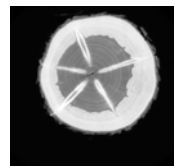
Fraxinus excelsior L.



Cecropia



Betula



Pinus sylvestris

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Thank you for your attention

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