Modeling distribution of trees stem circumference by species using LiDAR data in mixed deciduous temperate forests

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Contexte :

The development of sustainable forest management depends on an accurate description of forest resources. The required information concerns the stand structure, composition and dynamic. However, large scale field measurements are time consuming and generally inconceivable. Remote sensing technologies, in particular aerial multispectral LiDAR, raise new opportunities for large scale forest data collection.

Objectives:

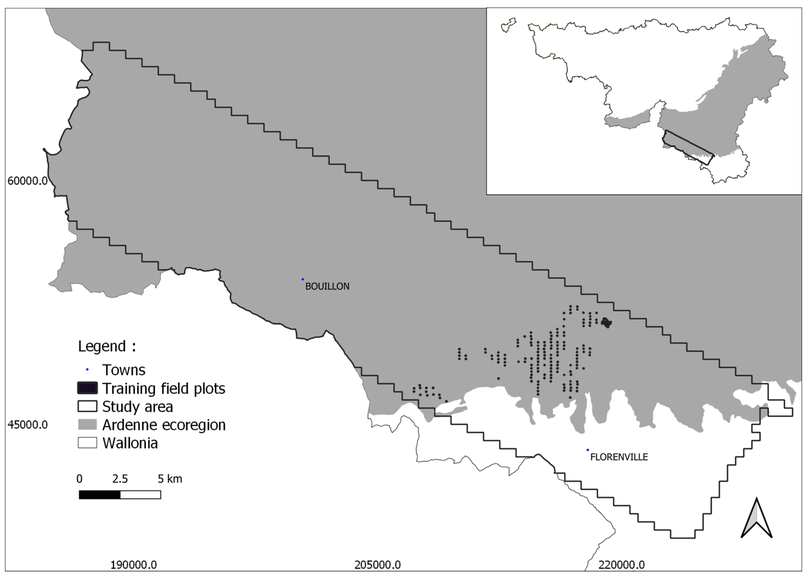
Our research aims to develop a new method using aerial LiDAR data to carry out a large scale forest inventory in a mixed uneven-aged forest of 22 Kha in the Ardenne ecoregion (southern Belgium).

Our objectives are the development of tools to identify tree species and estimate girth distributions by species.

Material :

❖ Study area

- 22 Kha of mixed uneven-aged forest in the Ardenne ecoregion (Southern Belgium)
- Main species : oaks and beech



❖ LiDAR data

Acquisition date : May 06-09 2018

Contracting authority : Direction des cours d'eau non navigables (spw)

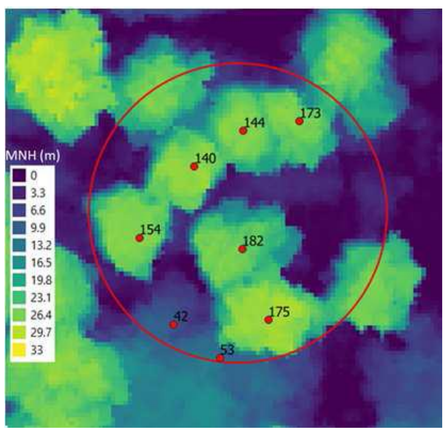
Mean fly altitude : 684 m

Captor : Optech Titan Dual Wavelength

Number of returns recorded : 4

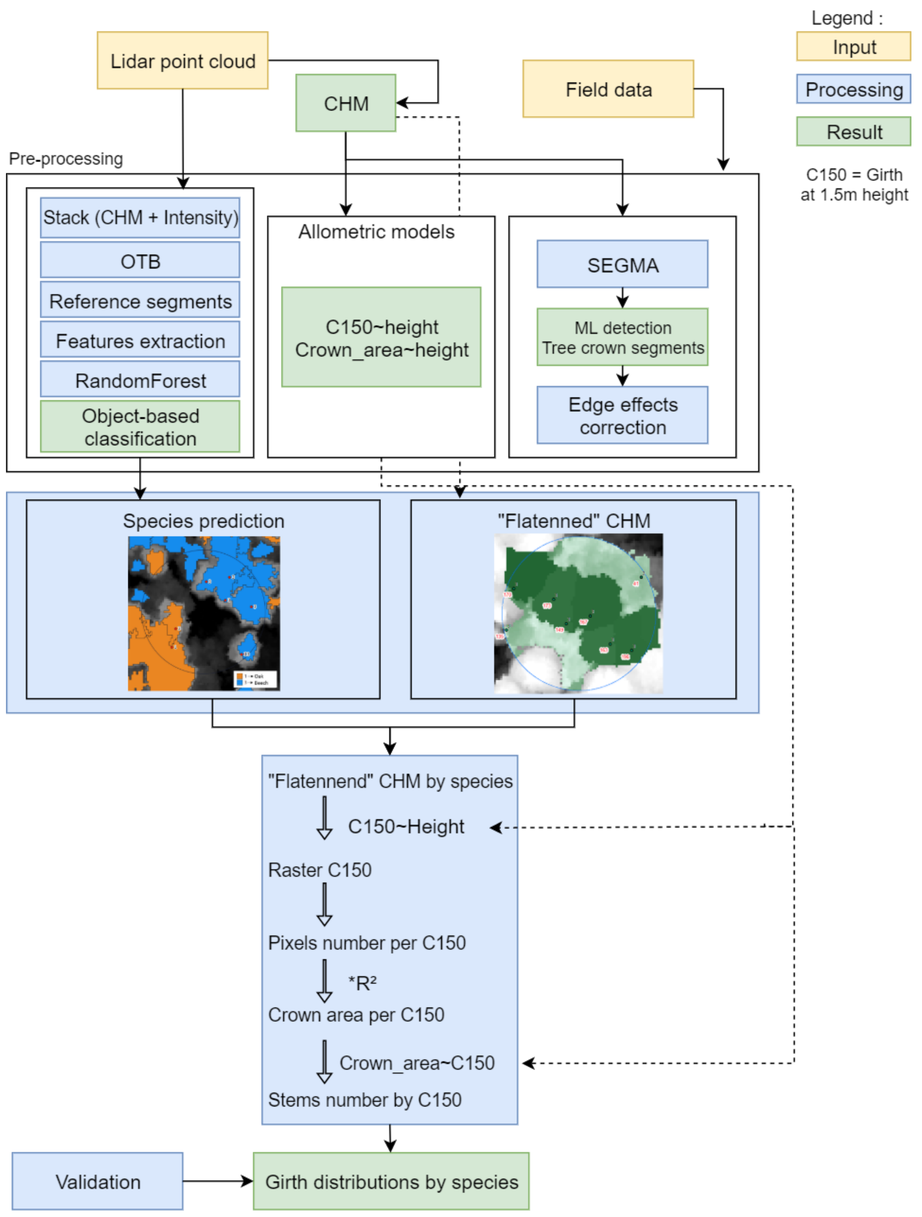
	Wavelength (nm)	Points density (pts/m²)
C2	1064	56
C3	532	48

❖ Field data

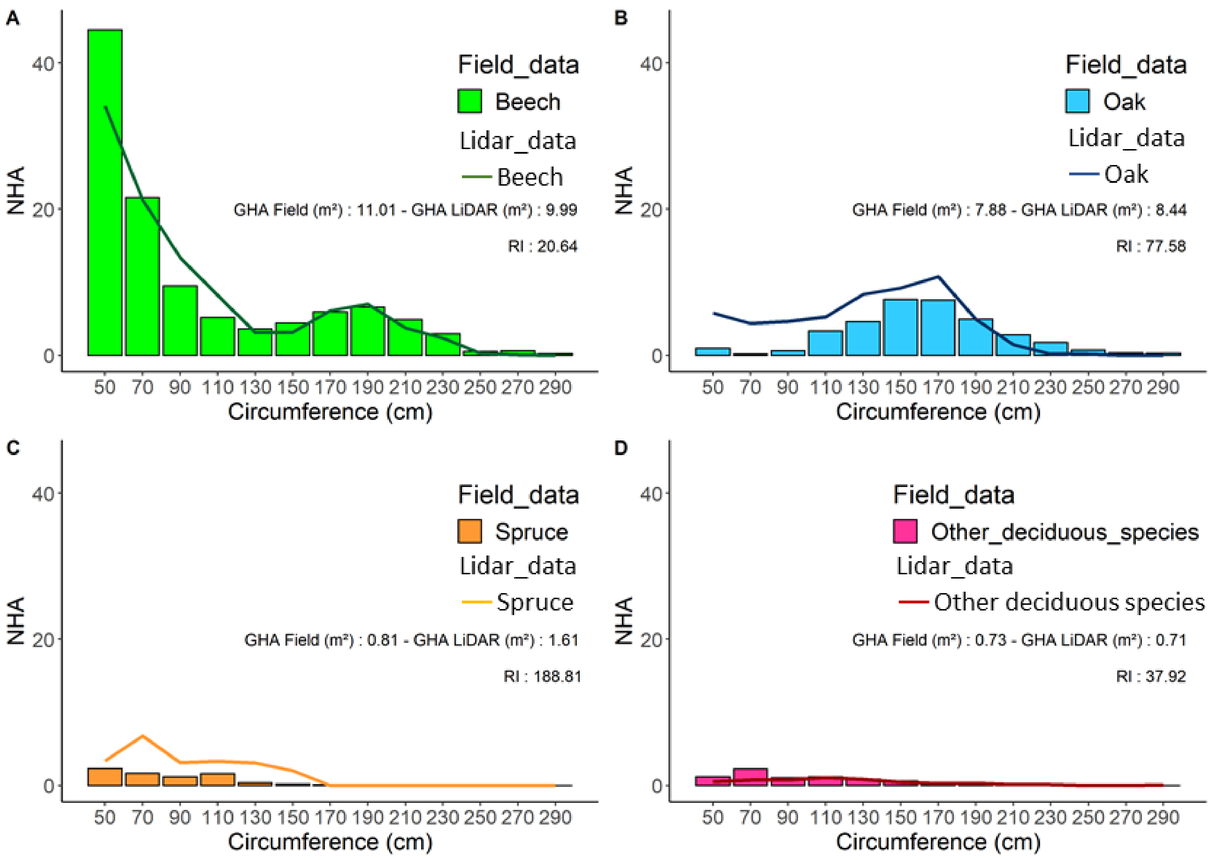


➢ Tree location, girth, species, sanitary status and height (only for dominant trees)

Method :



Results & Discussion



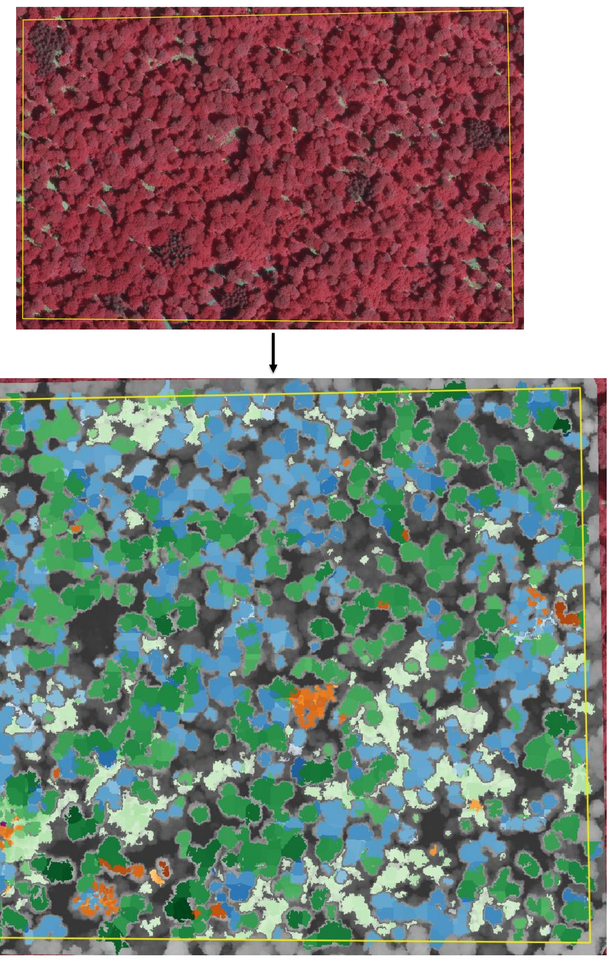
Field inventory : 137 plots – Total area : 949 ha
RI = Reynolds Index

- There is a lower accuracy for small trees (girth classes ≤ 90cm)
- Results are more accurate for the most represented species
- Simultaneous description of forest structure and composition
- Our standardized methodology is applicable to other case-study
- It should provide a good alternative to ITC methods

Applications :

- ✓ High resolution description of the forest
- ✓ Improving forest management through the ability to accurately map forest resource
- ✓ At regional scale, it could provide guidelines for policy makers
- ✓ Assess wood and carbon stocks

Management map example :



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