“Hcanopy”, a new site index to describe mature and irregular forests productivity: the case of old growth beech stands

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How can we estimate forest stand productivity in uneven-aged forests? Can we apply traditional site index, like in even-aged pure stands? Site index in even-aged stands requires knowing stand age, which is not known in even-aged. Will this be a problem?

These are the questions that inspired us to carry out this research.

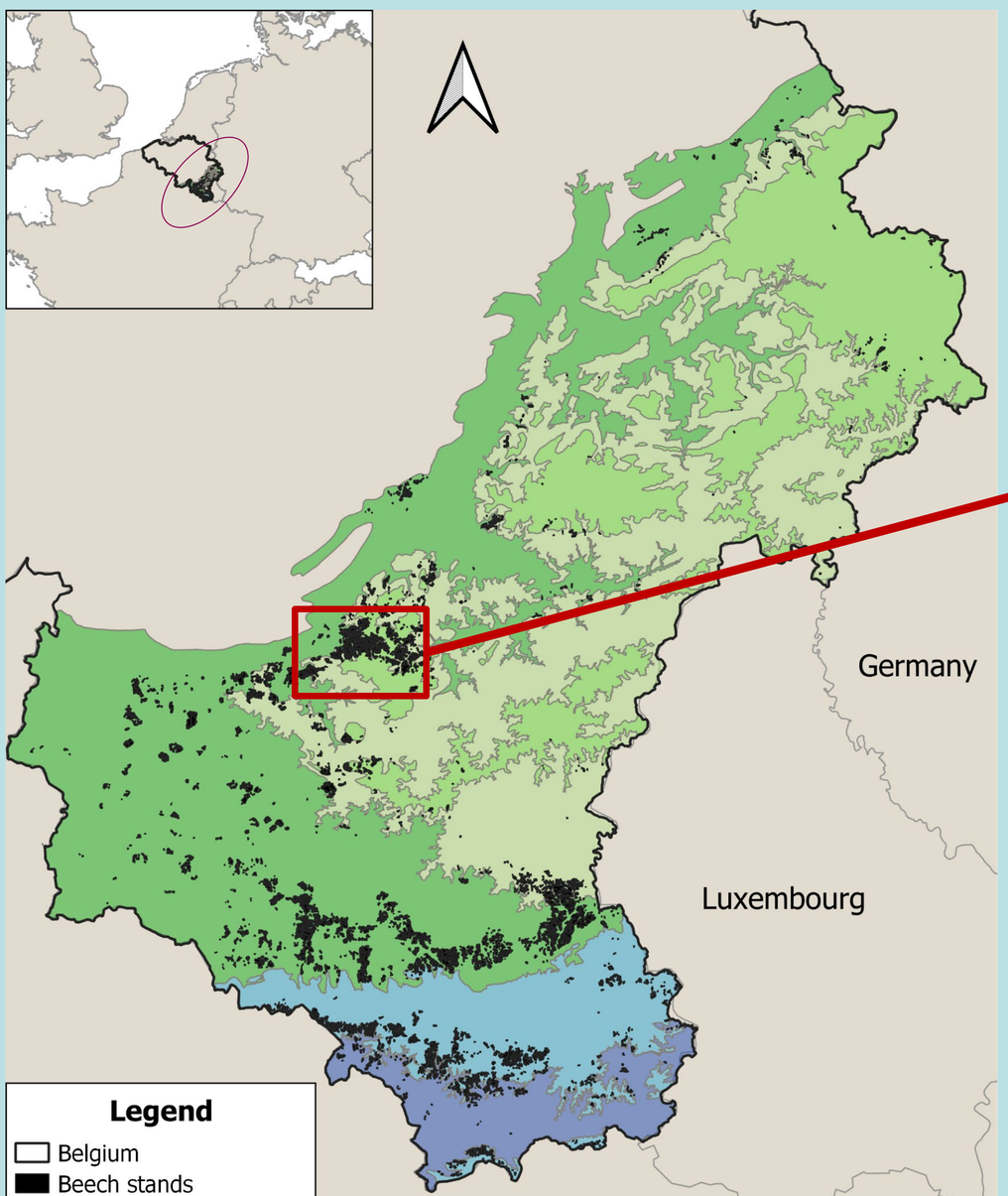
The analysis shows that the average maximum canopy height (Hcanopy), corresponding to the average height of the 10 tallest trees per hectare, is a good dendrometric indicator to describe the productivity level of uneven-aged and mature stands.

Study sites and methods

We selected mature and uneven-aged beech stands (*Fagus sylvatica*), in southern Belgium (15 000 ha). These forests were divided into 4000 polygons where abiotic conditions were homogeneous.

For each polygon, we calculated two categories of parameters :

(1) The response variable : Hcanopy;
(2) Explanatory variables describing environmental conditions (topographic, soil, present and past climate and silvicultural).



Results

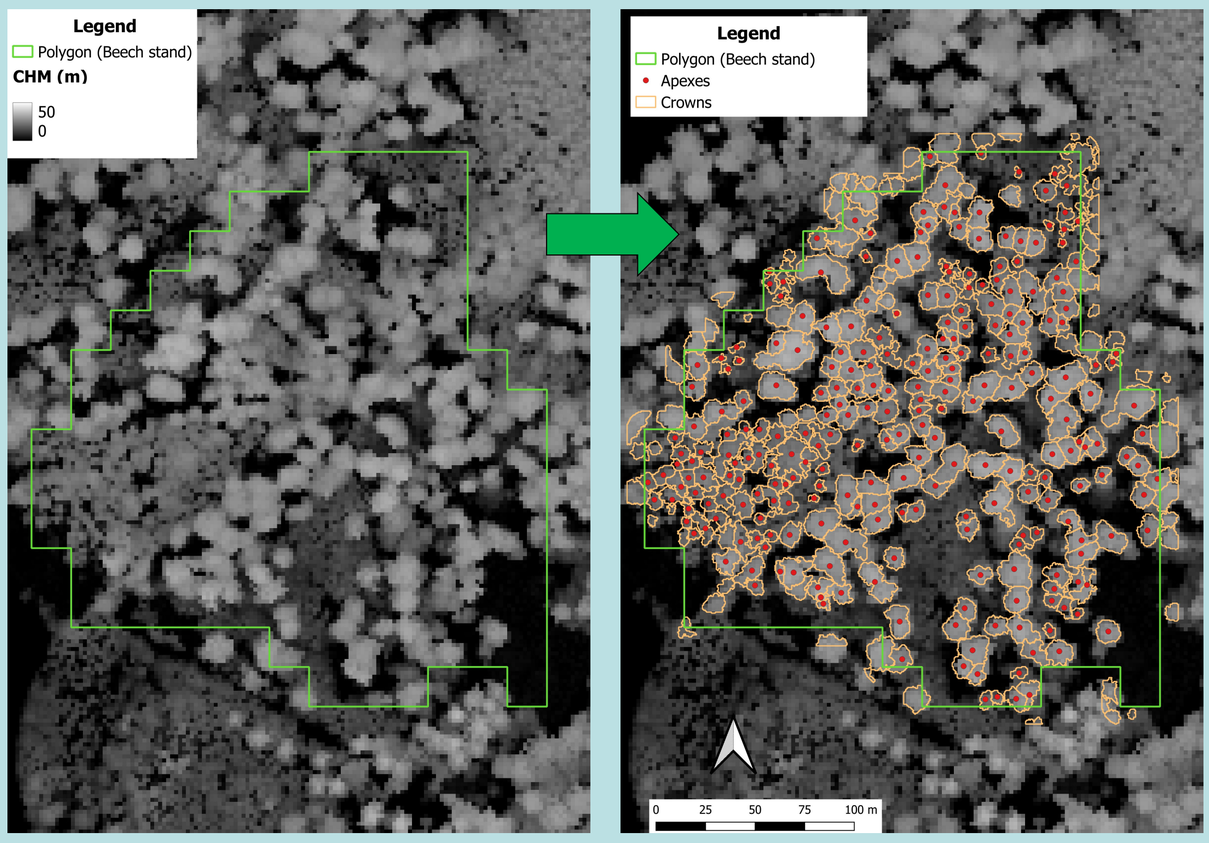


Fig.1: Example of Hcanopy computed for a mature beech polygon. First, we detected local maxima and the delimitation of the crown of each tree. Second, we identified the 10 tallest beeches/ha. Finally, we calculated their average to obtain Hcanopy index..

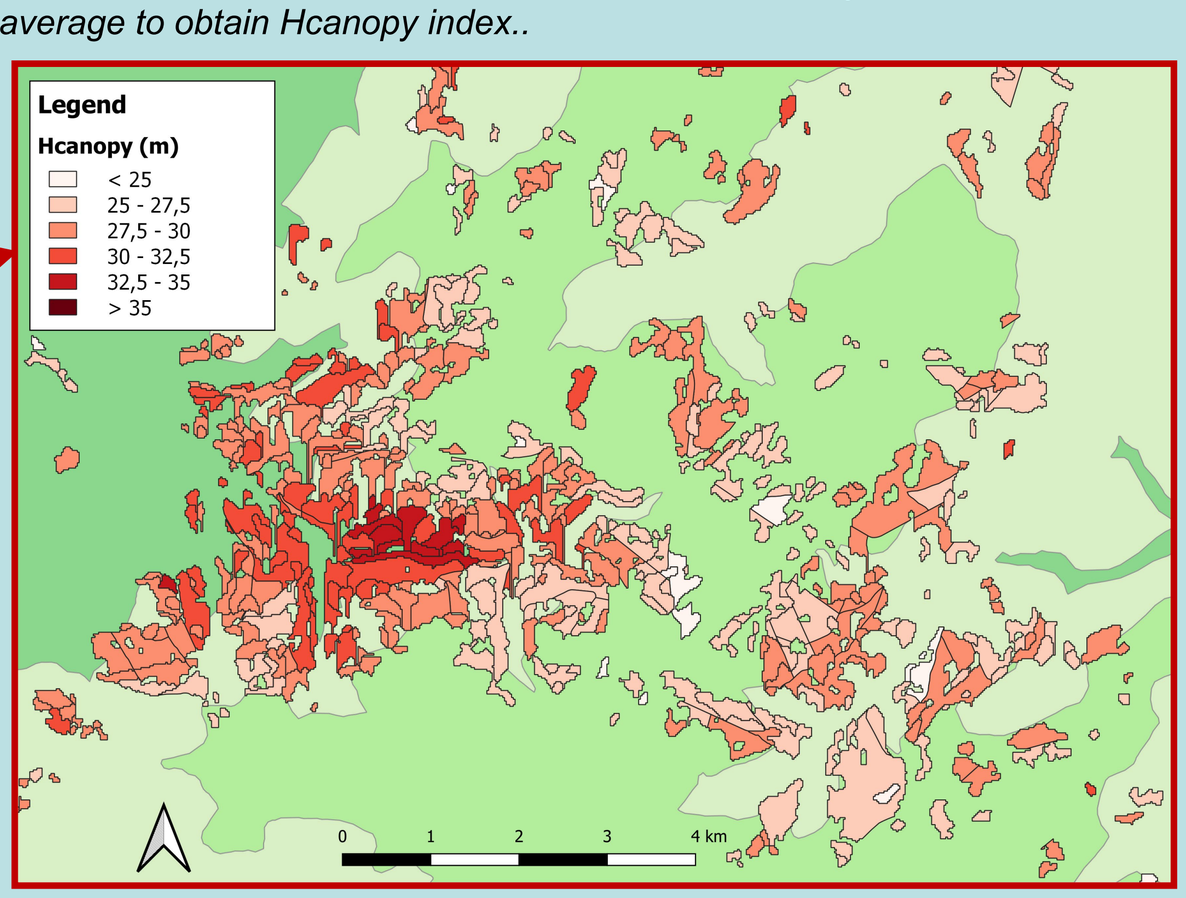


Fig.2: Mapping Hcanopy as an indicator of irregular beech forest productivity in southern Belgium.

Values of this indicator, calculated for each polygon were highly and significantly different between forest site types.

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Future research will determine and will describe factors effecting Hcanopy with multivariate analyses.
As well as links to beech decline, I am studying vitality loss and crown dieback in mature beech forests.