



Source: J. Hackenberg, H2020 DIABOLO

How to enrich forest information by the analysis of the hardwood saw log prices? Case study, hardwood in Bourgogne Franche-Comté, France

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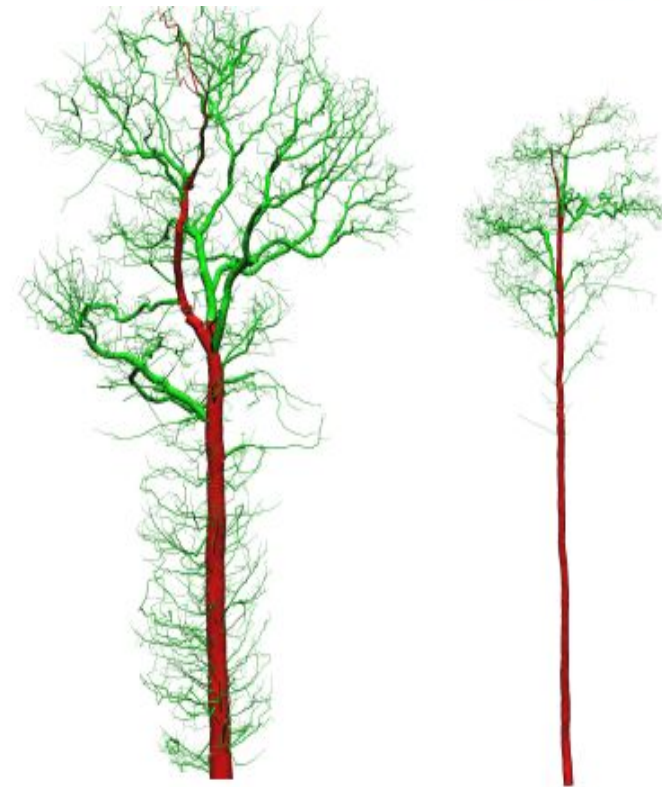
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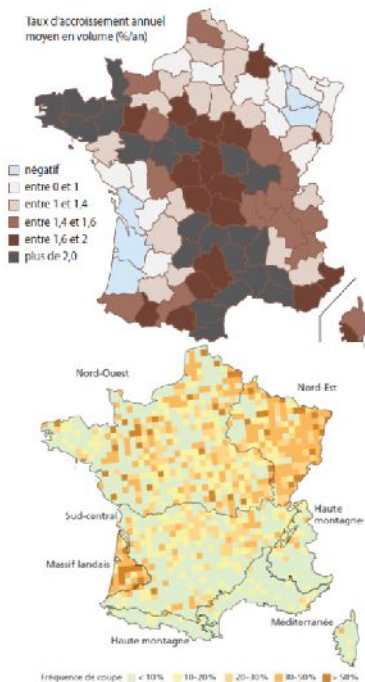
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Based upon the results of the National Forest Inventory, the 2016-2026 National Forest Plan was established and put in law in order to increase the Forest-Wood chain added value and jobs by increasing the annual harvested volumes

The industry managers formulate serious concerns on the availability of the timber volumes and qualities to be harvested in the next decade

The question that arises is how to improve the knowledge of the local forest resources in order to answer the questions asked by local forest and sawmilling companies?

For answering this question we

- try to identify the industry needs,
- analyzed NFI available data, volumes & qualities,
- analyzed the hardwood saw log prices of one million m3

and suggest a new way for improving forest information at a better spatial resolution



Industry needs

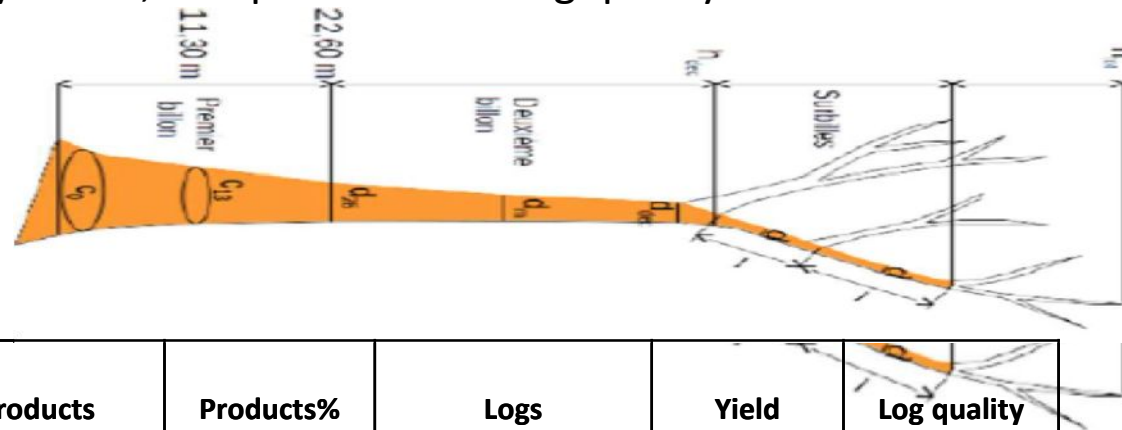
One forest resource, different end products

- Forest harvesting industry
- Sawmills, Lumber Custom Sorted
Floring, staves, pallets, structural,
Railway sleepers
- Peeled veneer
- ...and increasing log export to Asia





Industry needs, end products and log quality



Products	Products%	Logs	Yield	Log quality
Staves	12,5 %	20 %	75 %	A B+
Plot	1,4 %	80 %	60 %	B-
Sawn timber	84 %			C
Railway sleeper	1,4 %			D



The round wood/log qualities are used in industry,
the relationship with the standing tree quality (forest inventory) is not obvious



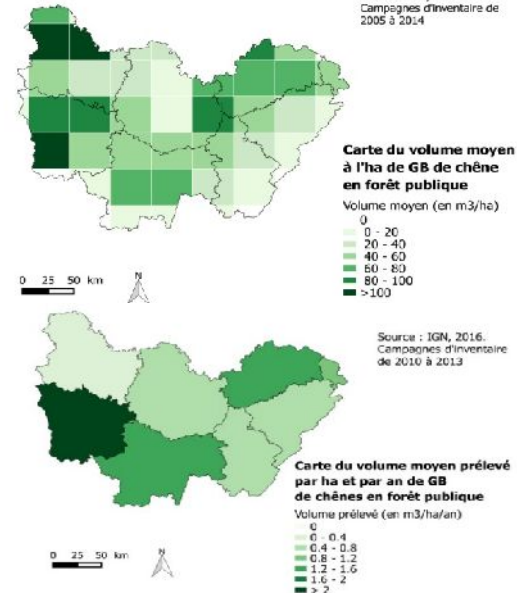
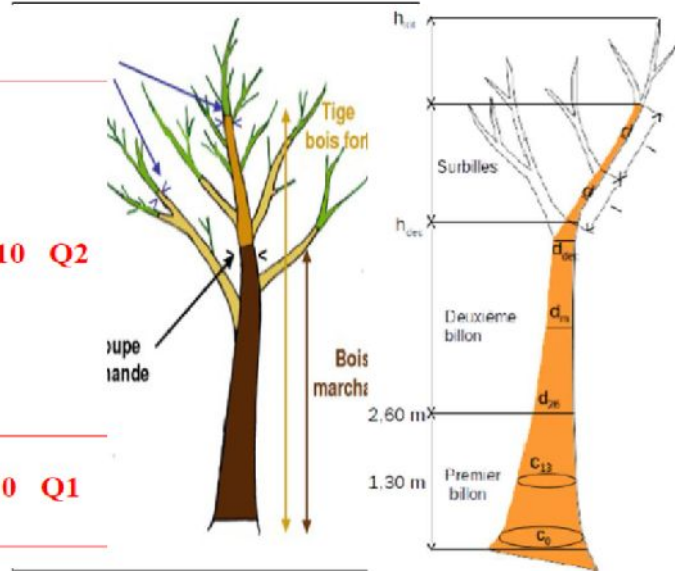
Available data from the national forest inventory

Volumes, increments, tree stem quality, very low spatial resolution
 Pixels size=40kmX40km



8/10 Q2

2/10 Q1



Field measurements are at the individual tree level. For a single species, the statistical results from NFI are valid at a resolution which is not compatible with the industrial needs

The question is now how to improve these forest information?



Analysis of the hardwood saw log prices

Data from ONF

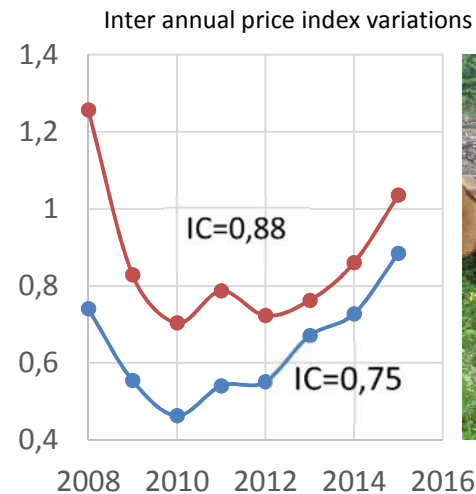
Number of lots ~4000
 Time span, 2008-2015
 About one million m³

For each lot

- Geographic location
- Price paid
- Volume
- Number of stems
- Oak volume
- Name of the buyer company

Variables calculated from data

Price index
 Simulated Dbh per lot
 $IC = \text{oak volume} / \text{hardwood volume}$

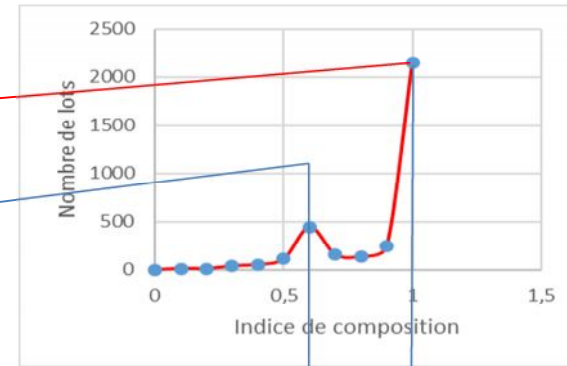
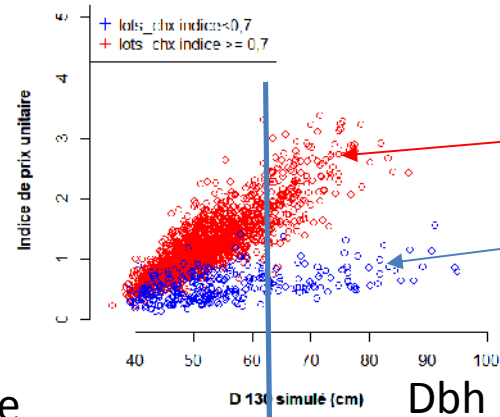




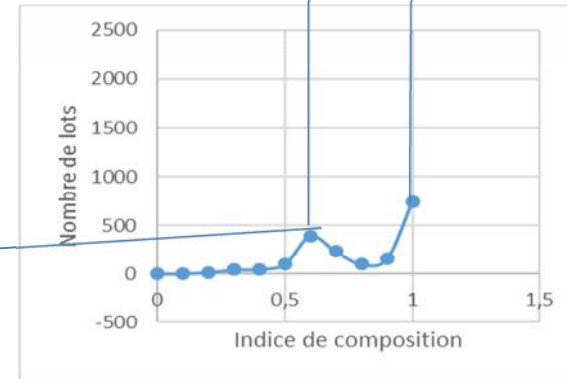
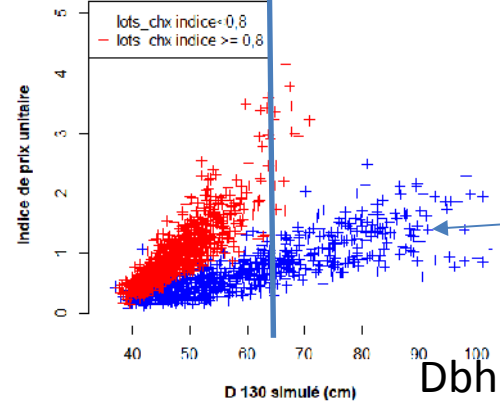
For a given Dbh, prices are higher when the oak volume proportion is higher



Price

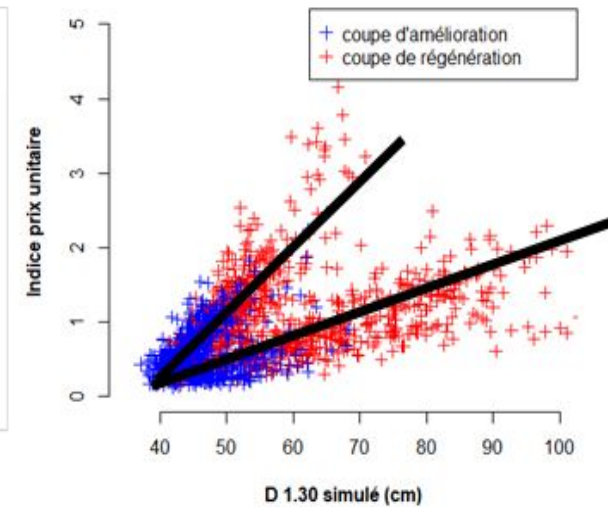
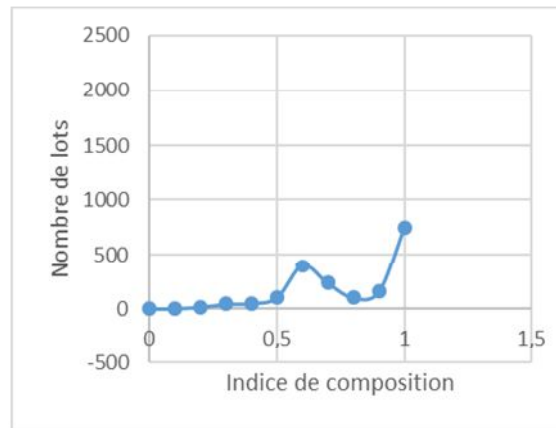
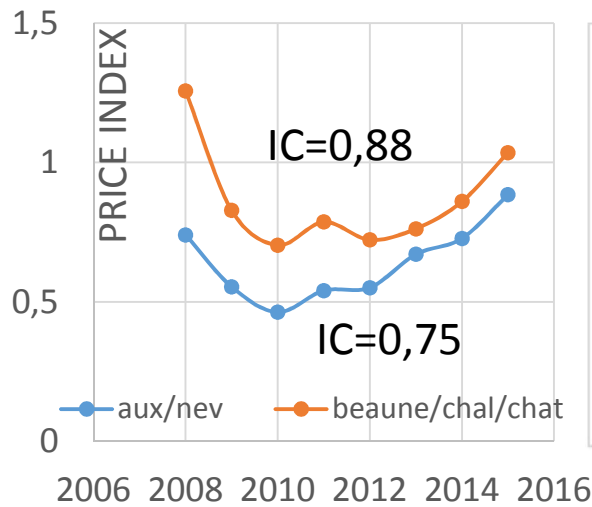


Price





Variables of interest are,
 Price Index, Dbh, and IC, the proportion of oak volume
 A linear regression...



$$Price\ index = a * D_{bh} + b * IC + c$$

D_{bh} , diameter at breast height

IC, [oak volume/total volume] of each lot



What we learn with this model?

$$\text{Price index} = a * D_{bh} + b * IC + c$$

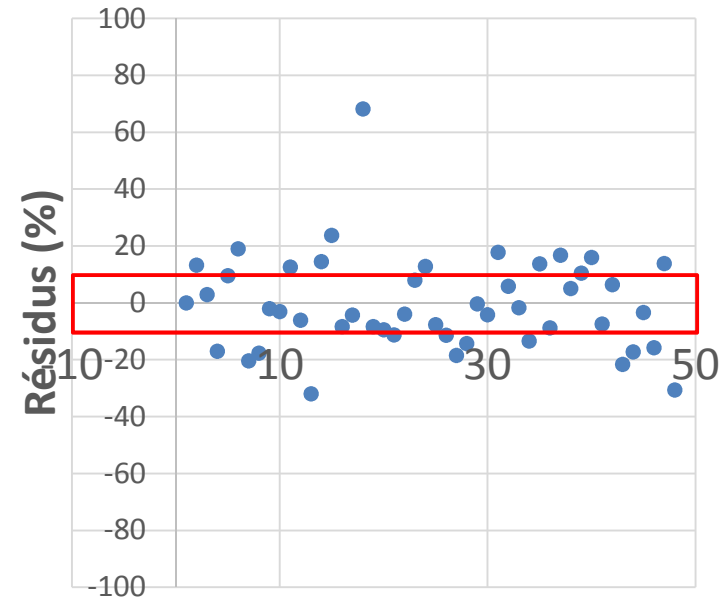
D_{bh} , diameter at breast height

IC, [oak volume/total hardwood volume] of each lot

74% of the Price Index variance is explained

For 50% of the buyers, the model predicts well the prices paid (within a range of +/- 10%)

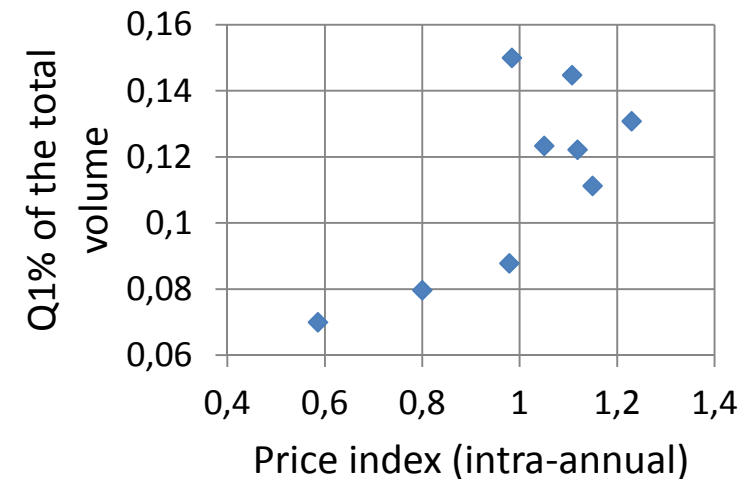
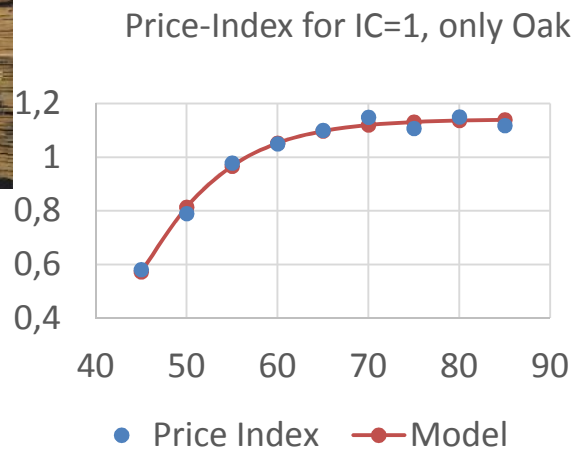
25% of the buyers pay higher prices/lower prices:
why? Better/lower adequation between quality and technology?





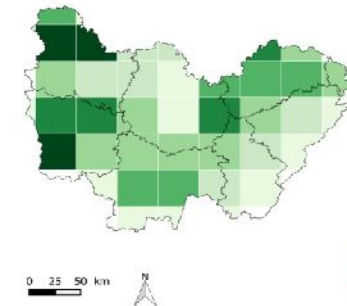
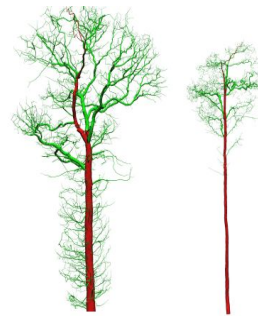
What we learn with this model?

By combining this model (left) with previous knowledge, the relationships between the proportion of log quality and DBH
We can produce new information, the price paid permits to estimate the log quality proportion for each harvested forest



Conclusions and perspectives

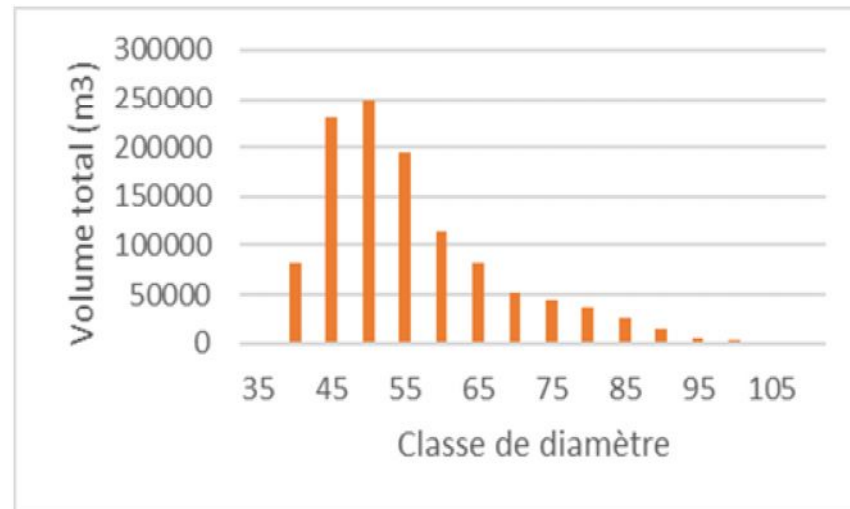
Wood properties studies should be designed for a known and well described forest resource context
National NFI data have a low resolution often not well adapted for local industry purposes
Multisource forest information need to be assembled
In our case, about 4000 additional information could be added on this map at marginal additional cost
Other technologies such as LIDAR are also the future for increasing this map resolution



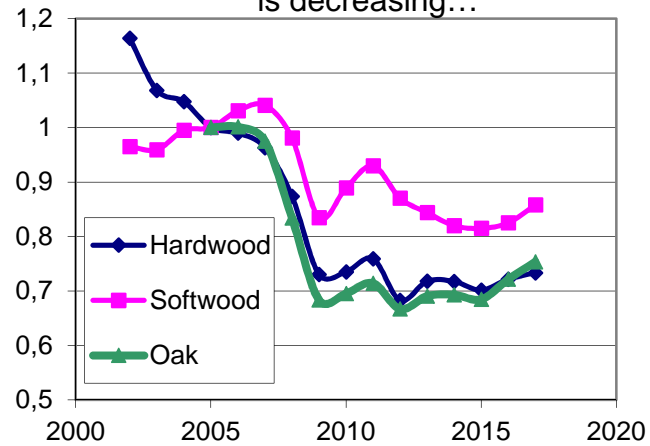
Source : IGN, 2016.
Campagnes d'inventaire de
2005 à 2014

**Carte du volume moyen
à l'ha de GB de chêne
en forêt publique**

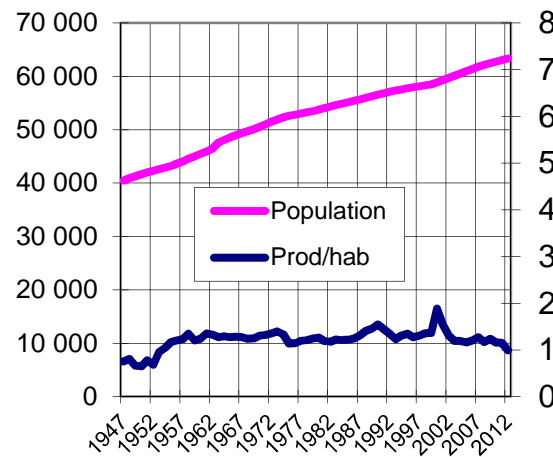
Volume moyen (en m³/ha)
0
0 - 20
20 - 40
40 - 60
60 - 80
80 - 100
>100



In France sawn Timber production is decreasing...



FRANCE



NEW ZEALAND

