

# Yasso 07. French case study

Laurent Saint-André, Delphine Derrien, Manuel Nicolas, Mathieu Jonard

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# YASSO-07
# French case study



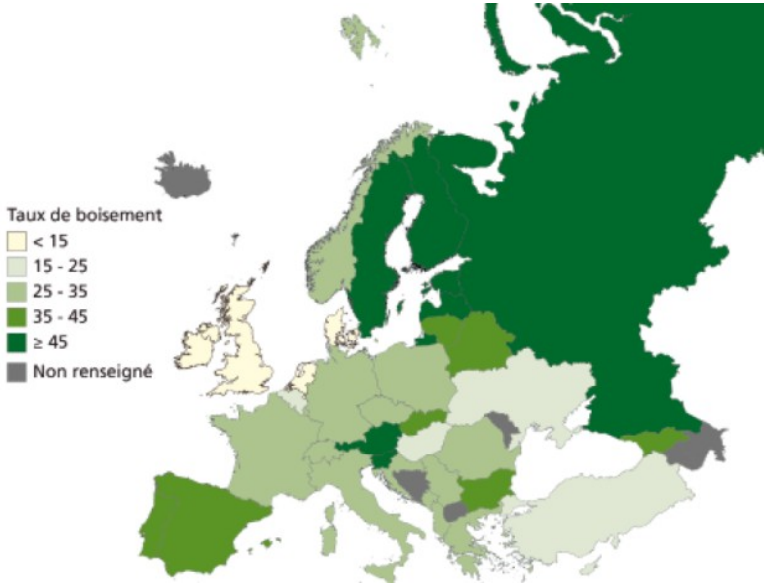

Laurent SAINT-ANDRE, Delphine DERRIEN, Manuel NICOLAS, Mathieu JONARD

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Advanced Research on the Biology of Tree and Forest Ecosystems

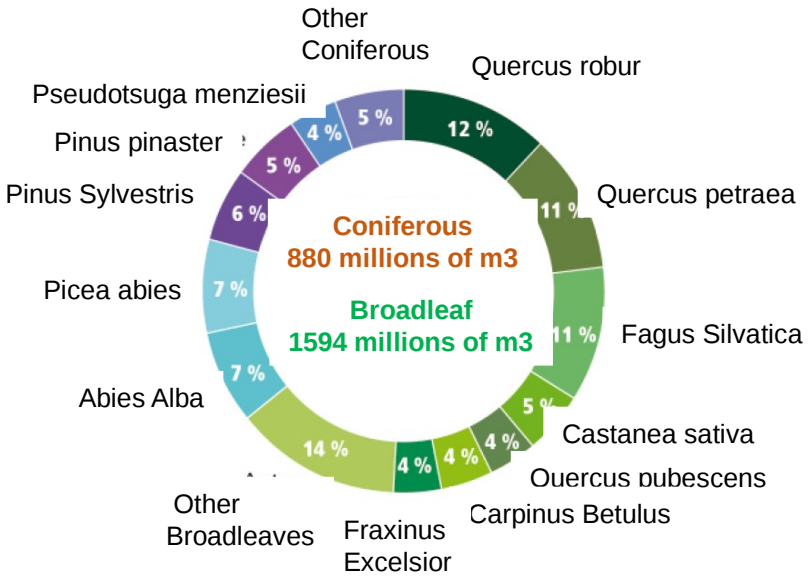
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***Forest land (% of land cover, source European State of Forests, 2011)***




***© IGN 2012***

# Introduction

## Panorama of the French Forest

Land cover area : 29.7% is Forests (Europe average, including Russia 32.2%)

Forest owners: 75% private, 25% public

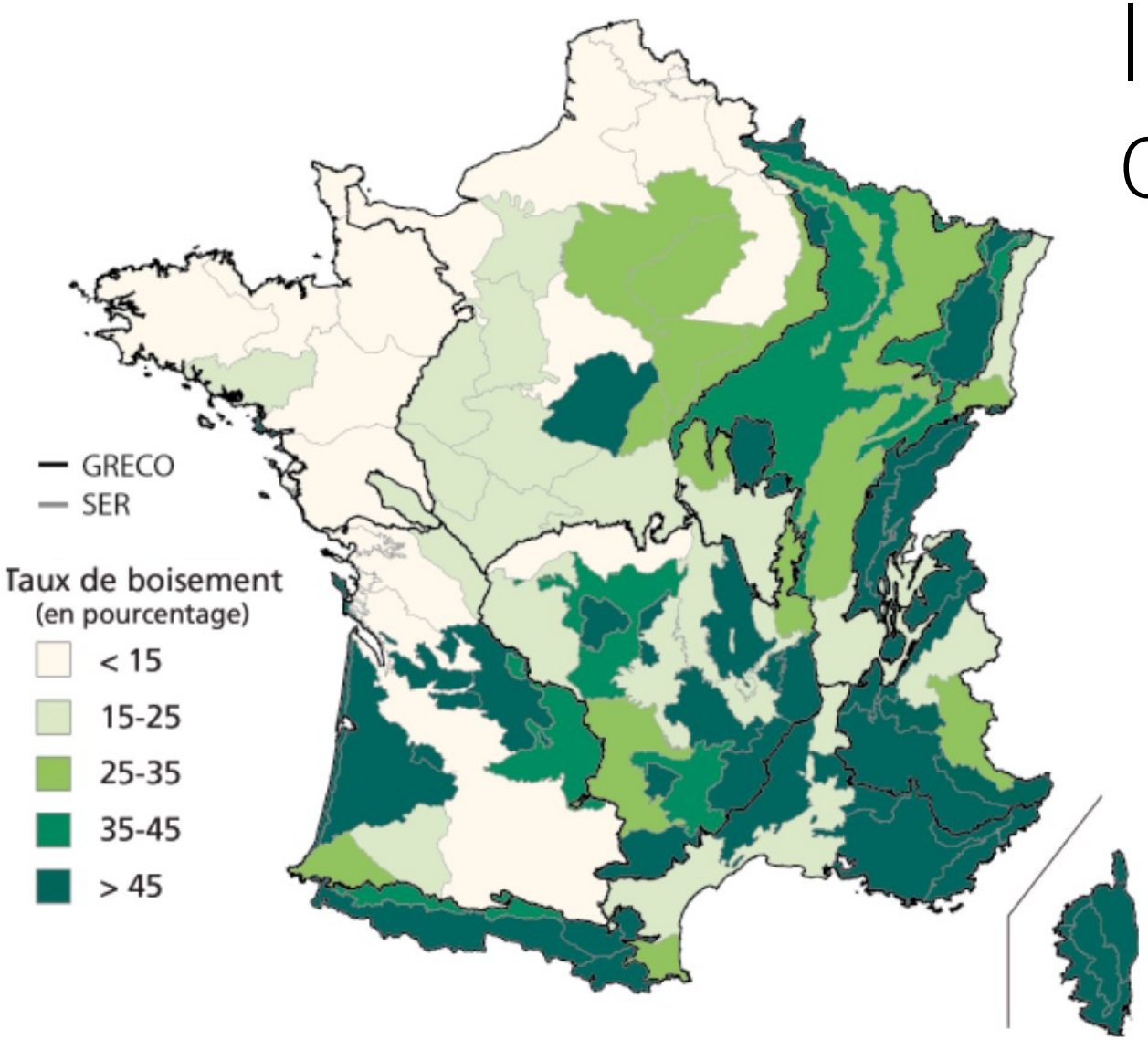
Total Volume (m3): 2.5 billion = 4th European country after Russia, Germany, Sweden.

Forest Composition : Broadleaves species (67%), Coniferous species (22%), Mixed stands (11%)

**12 tree species contribute to 80% of the total volume of French Forests**

# Introduction

## Panorama of the French Forest



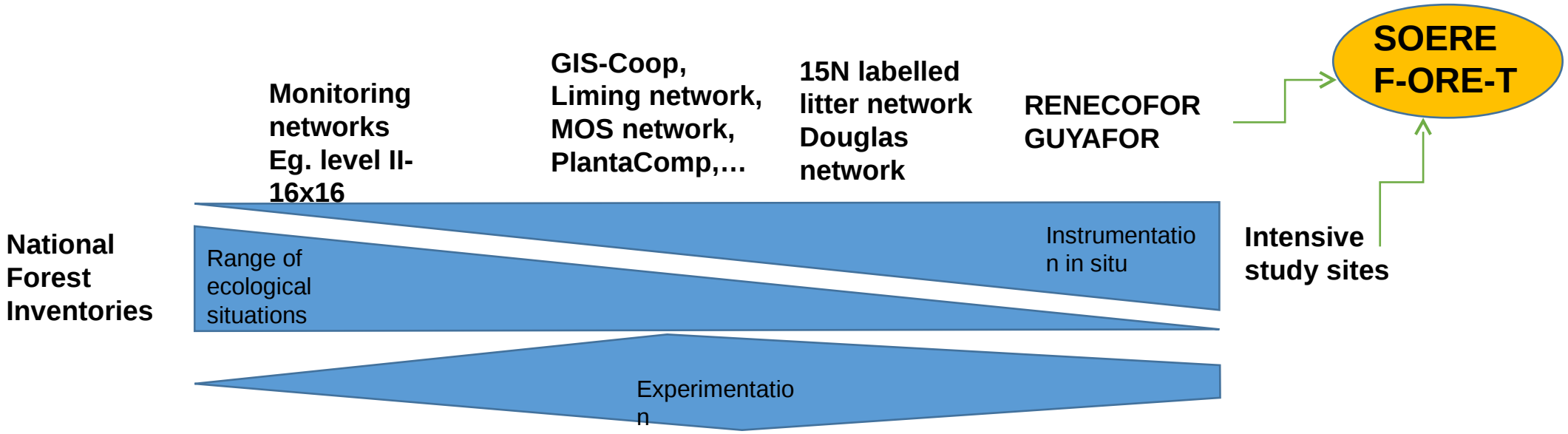

National Forest Inventory: The Institute (IFN) in charge of the national inventory has been embedded into the National Geographic Institute in 2012

Yearly assessment of forest inventory (it was every ten years before 2008)

Results provided by administrative departments and by SylvoEcological Regions : 91 SER and 12 GRECO

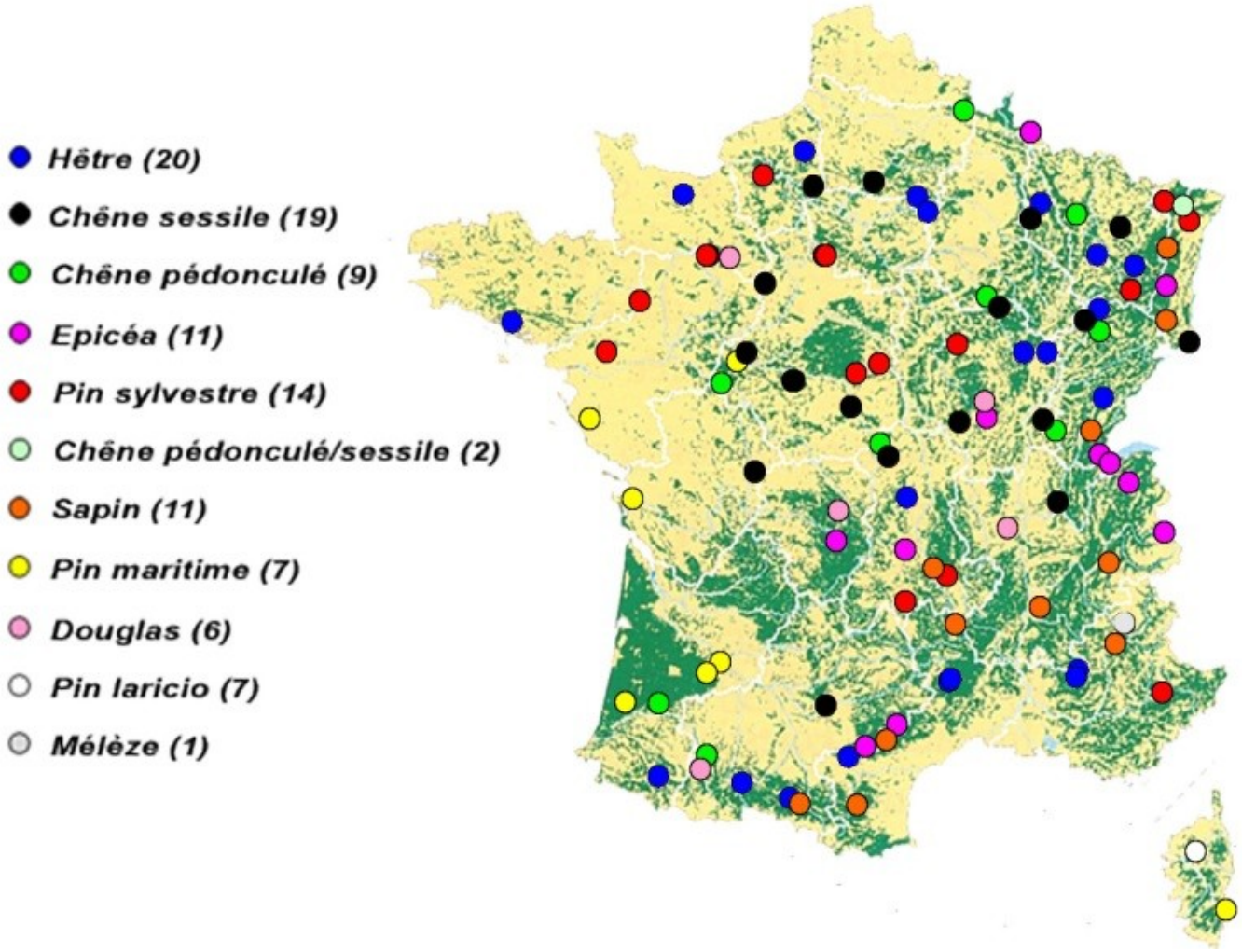
SER = SylvoEcologicalRegion (determinants of forest growth conditions and habitats)

GRECO = Ecological regions (one GRECO regrouping several SER)




Take advantage of the high (but structured) diversity
of monitoring and experimental networks in forest ecosystems

Let’s open the black box !!

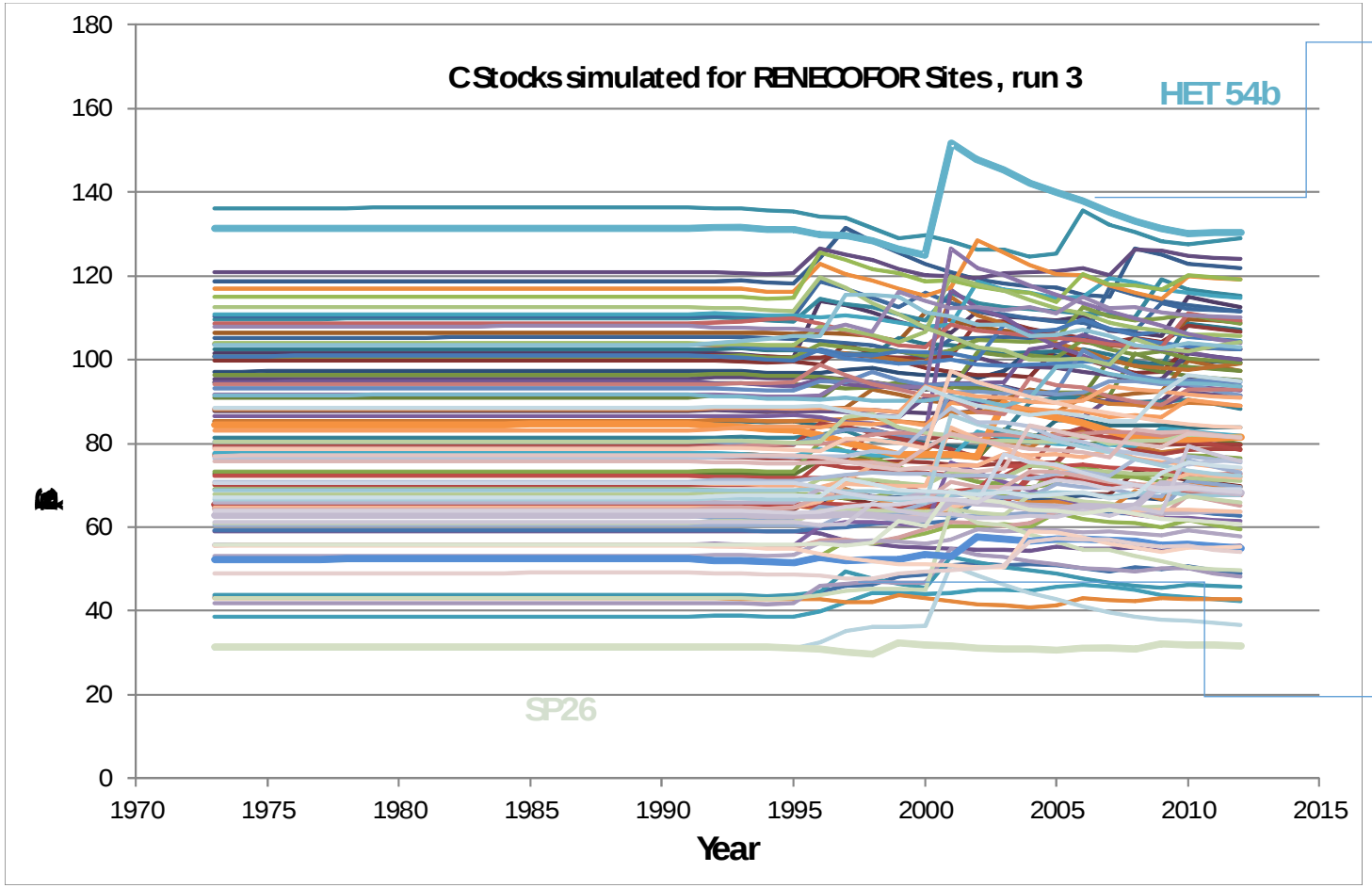



102 plot of the RENECOFOR Network

## An unique dataset in forest ecosystems

- Cover the main tree species in France
- Aboveground litterfalls measured between1994-2008 (leaves, branches, fruits et miscellaneous).
- Regular forest inventories combined with biomass models (above- and below-ground biomass) allowed to estimate the inputs after each thinning and each storm
- Soil carbon stocks have been measured in 93-95 and in 07-12.
- Climatic datasets are coming from RENECOFOR own recording and Meteo France.

# Good results in average




1999 storm, plot HET 54b

Spinup procedure with average climate and litter inputs

Thinning

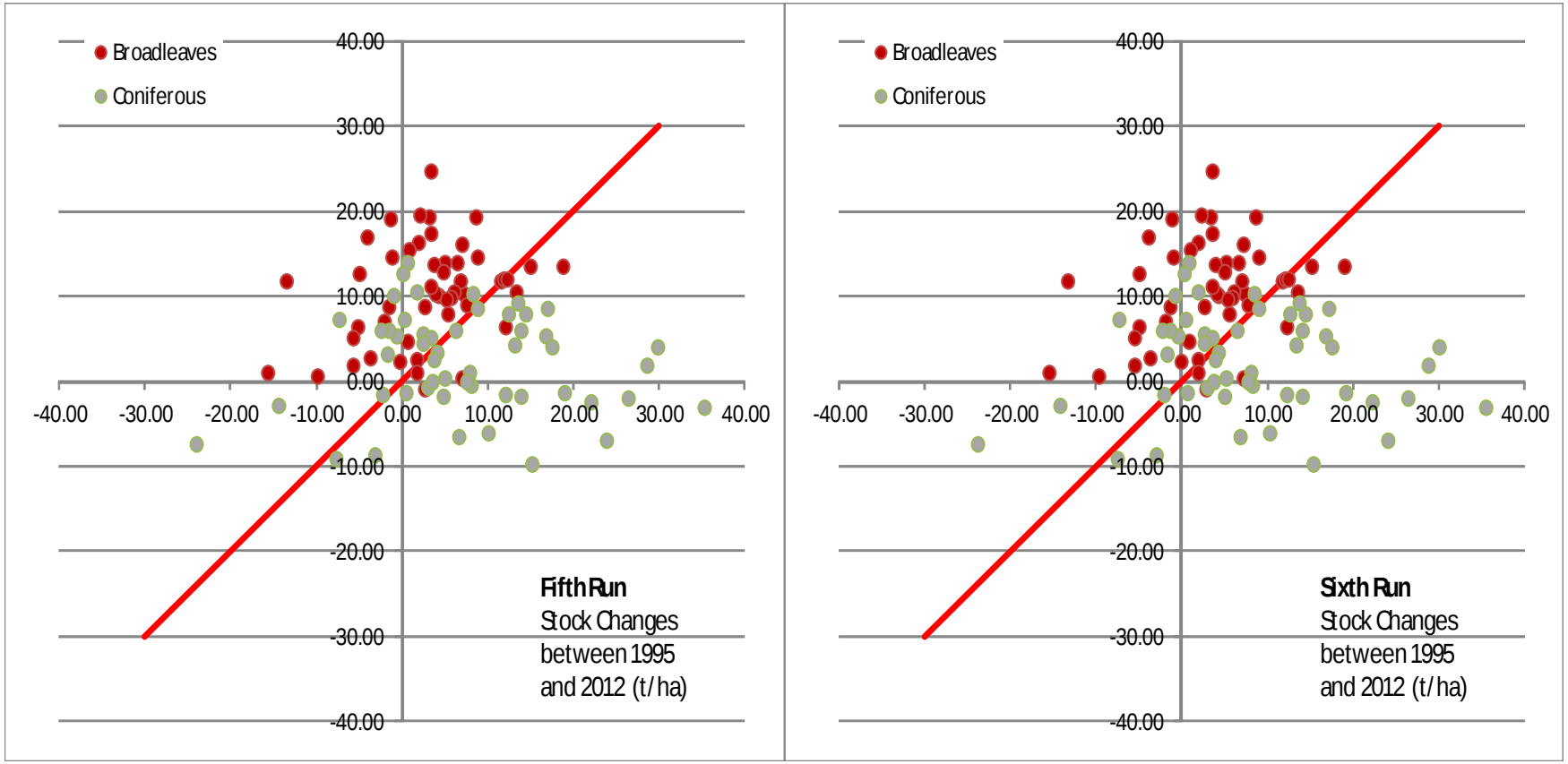
| | Observed (tC/ha) | Yasso07-6rdRun (tC/ha) |
|---|---|---|
| Mean | 80.9 | 81.6 |
| SD | 29.9 | 22.8 |
| CV | 37% | 28% |

Actual climate and litter inputs (evaluation of the stock changes)

| | Observed (tC/ha/period) | Yasso07-6rdRun (tC/ha/period) |
|---|---|---|
| Mean | 5.6 | 6.1 |
| SD | 9.5 | 7.2 |
| CV | 170% | 118% |

# BUT, not at the stand / species level…….

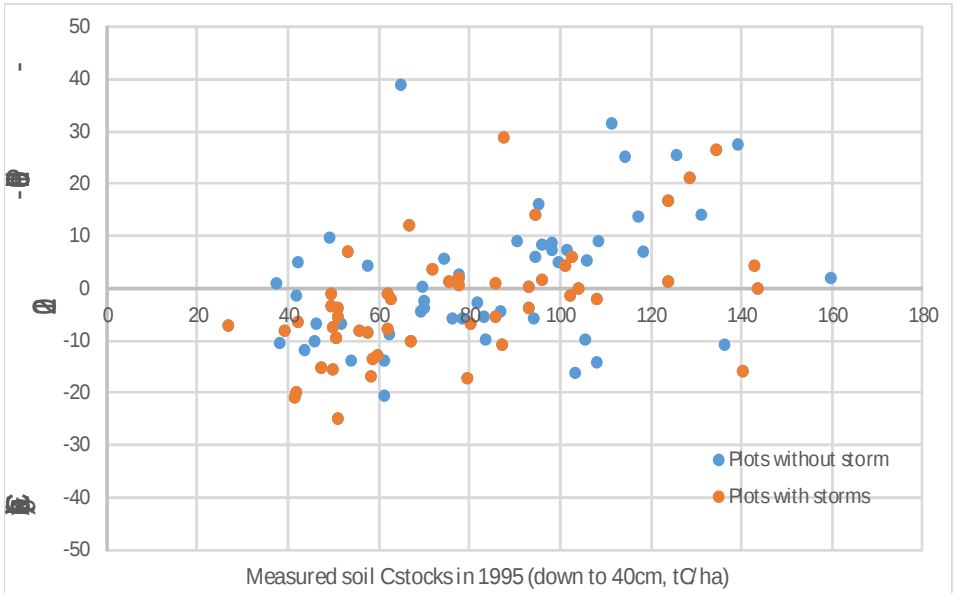
Without considering species biochemistry of the litters



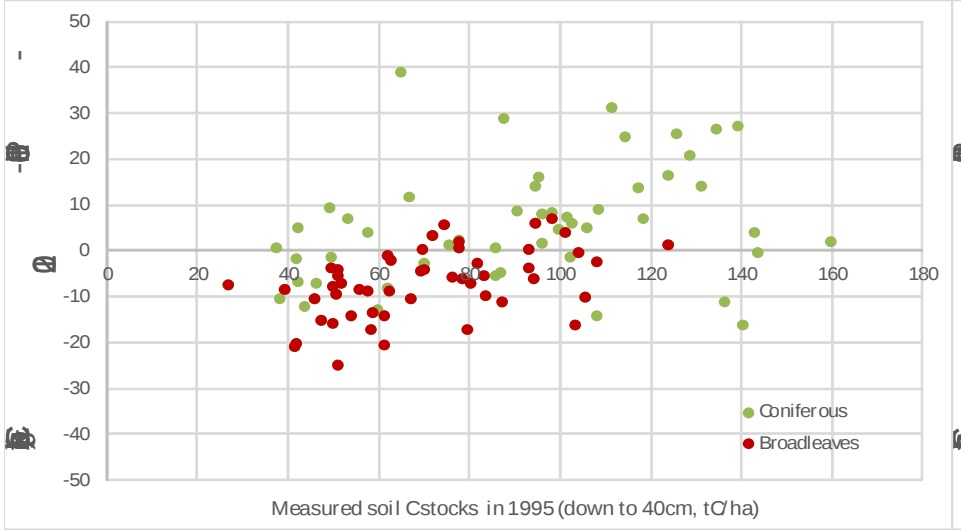

Taking species specific biochemistry of the litters

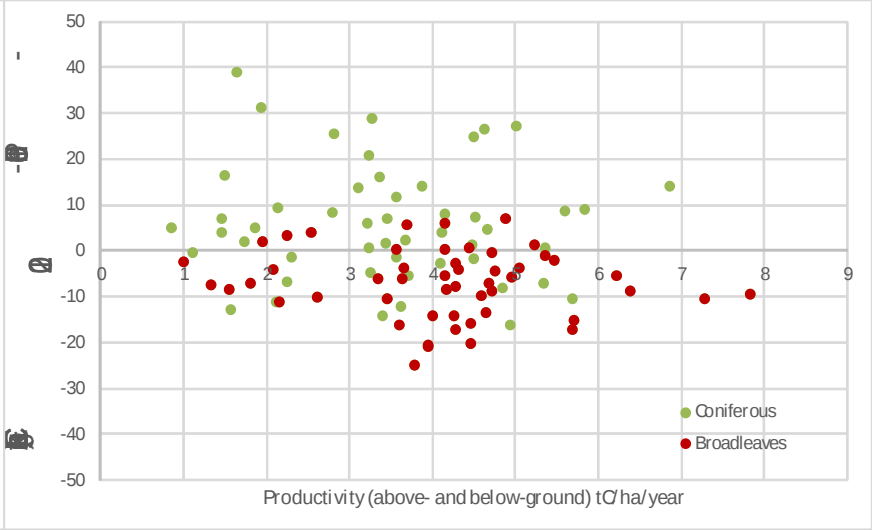
Same results for both stocks and stock changes…….

# Error tracking…….




- Error well correlated to the initial stock
  - Past history ? But also wrong estimate of the partitionning of SOM into the biochemical components
- Species effect (on the intercept and interaction with the stand productivity)
    - Biogeochemistry of the litter not well taken into account
    - Too much emphisize on the amount of the litter
- Fertility effect (slight)
  - The litter inputs do eliminate most of the impact of soil fertility on SOC dynamics, but not all. It remains a slight effect of soil properties



# Conclusion on the Yasso model

The architecture of Yasso based on a biochemical partitioning of SOC is particularly relevant to tackle the challenge of assessing assess fluxes at decades to centuries time scale

But it need to be reparametrized for French application with more contrasted values for the Acid, Ethanol and Non soluble pools (like in Tuomi et al., 2011a Ecological Modelling; 2011b, Environmental Modeling and Software)

And also may be an improvement to take, at least, humus type into consideration (cf work of J. Salleles)