



Yasso 07. French case study

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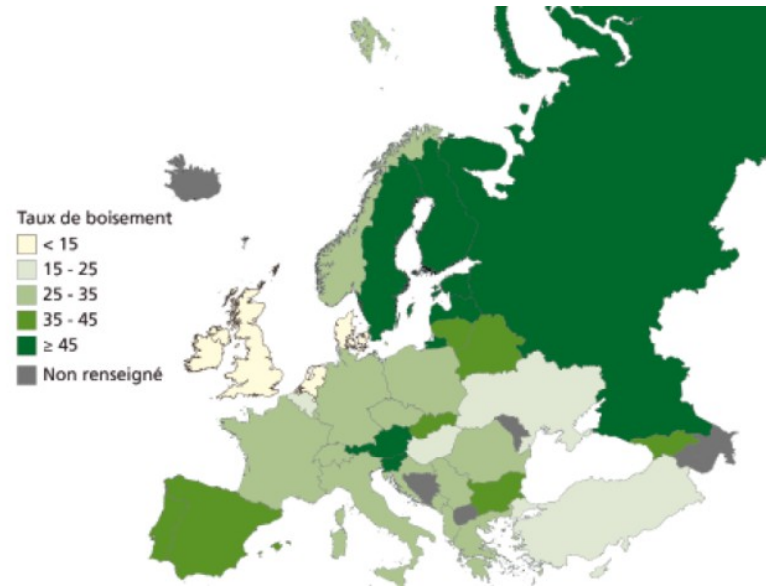
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YASSO-07

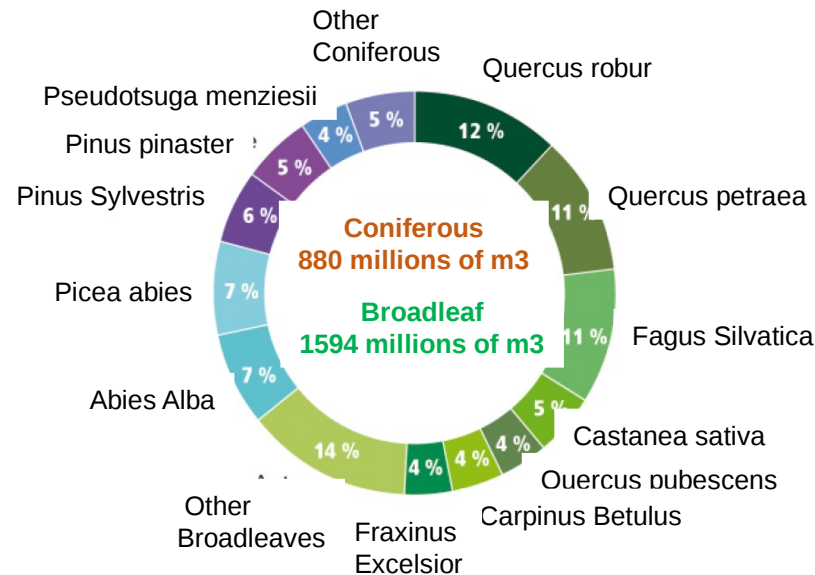
French case study



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



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



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

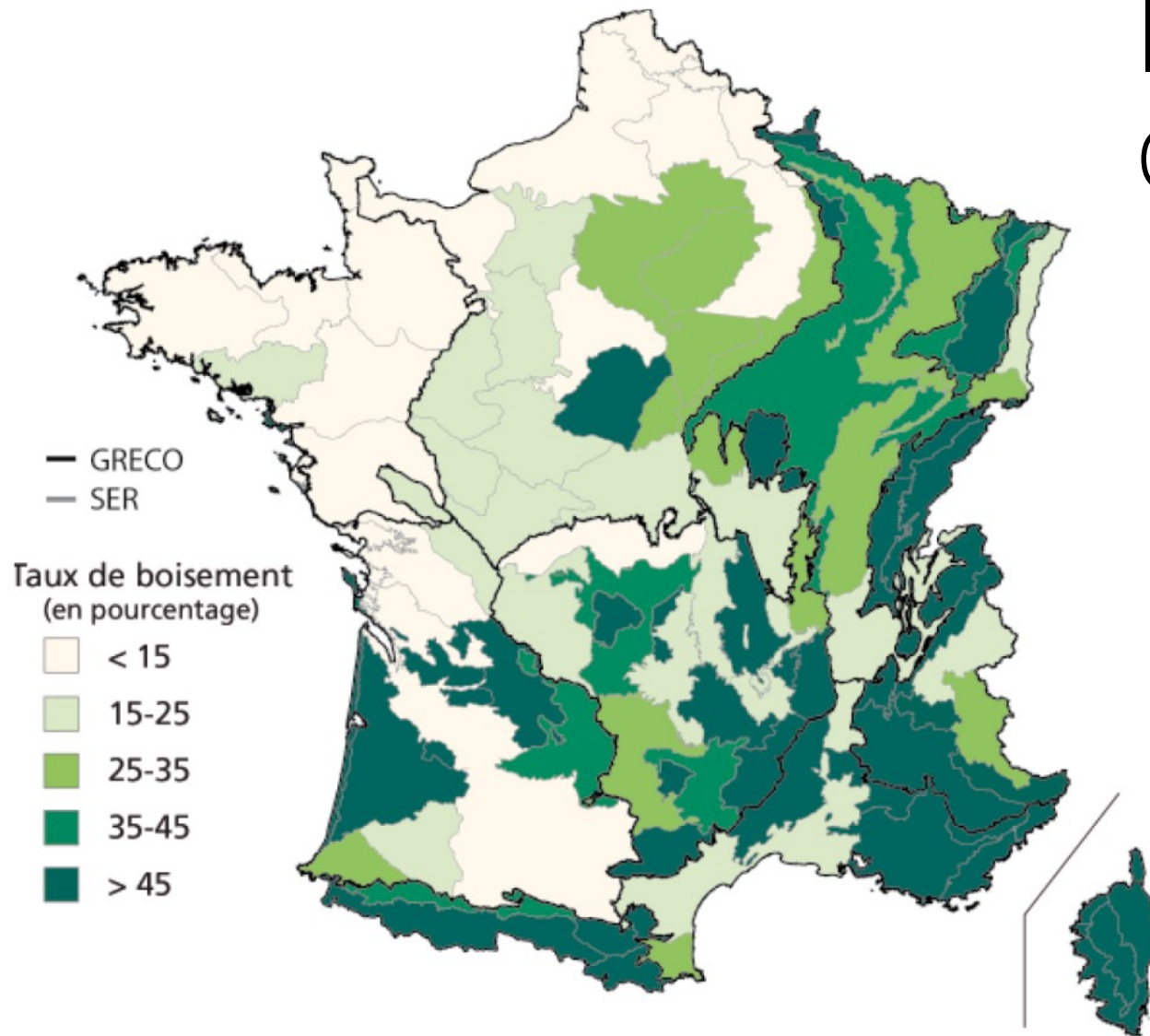
Total Volume (m³): 2.5 billion = 4th European country after Russia, Germany, Sweden.

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

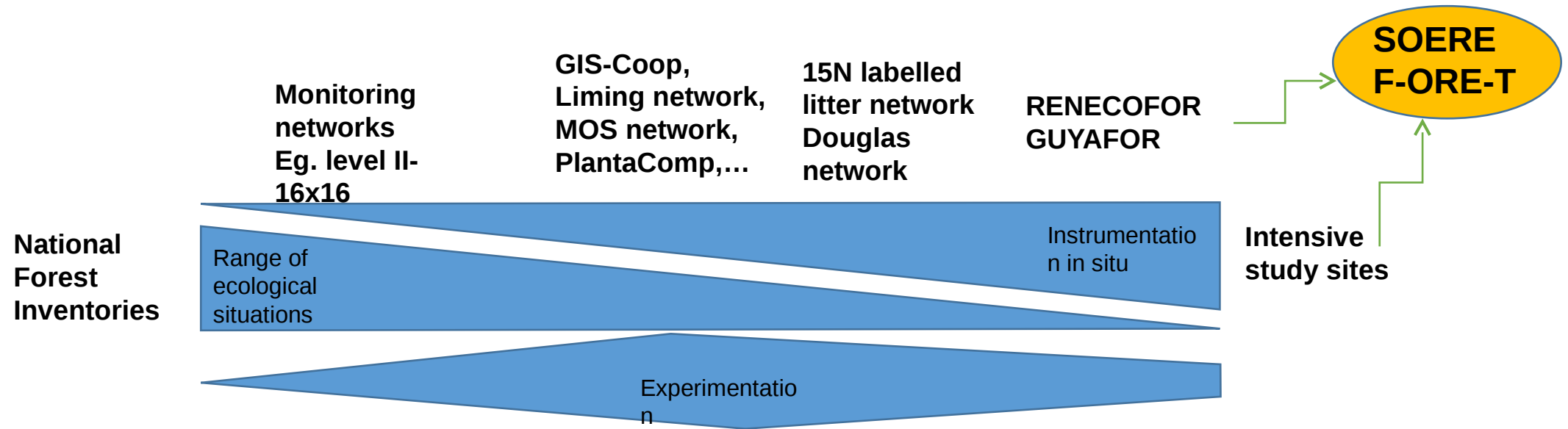


National Forest Inventory: The Institute (IFN) in charge of the national inventory has been embedded into the National Geographic Institute in 2012

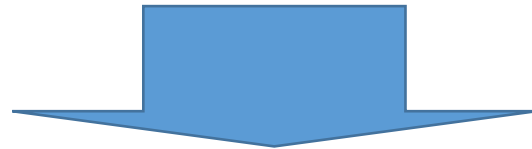
Yearly assessment of forest inventory (it was every ten years before 2008)

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

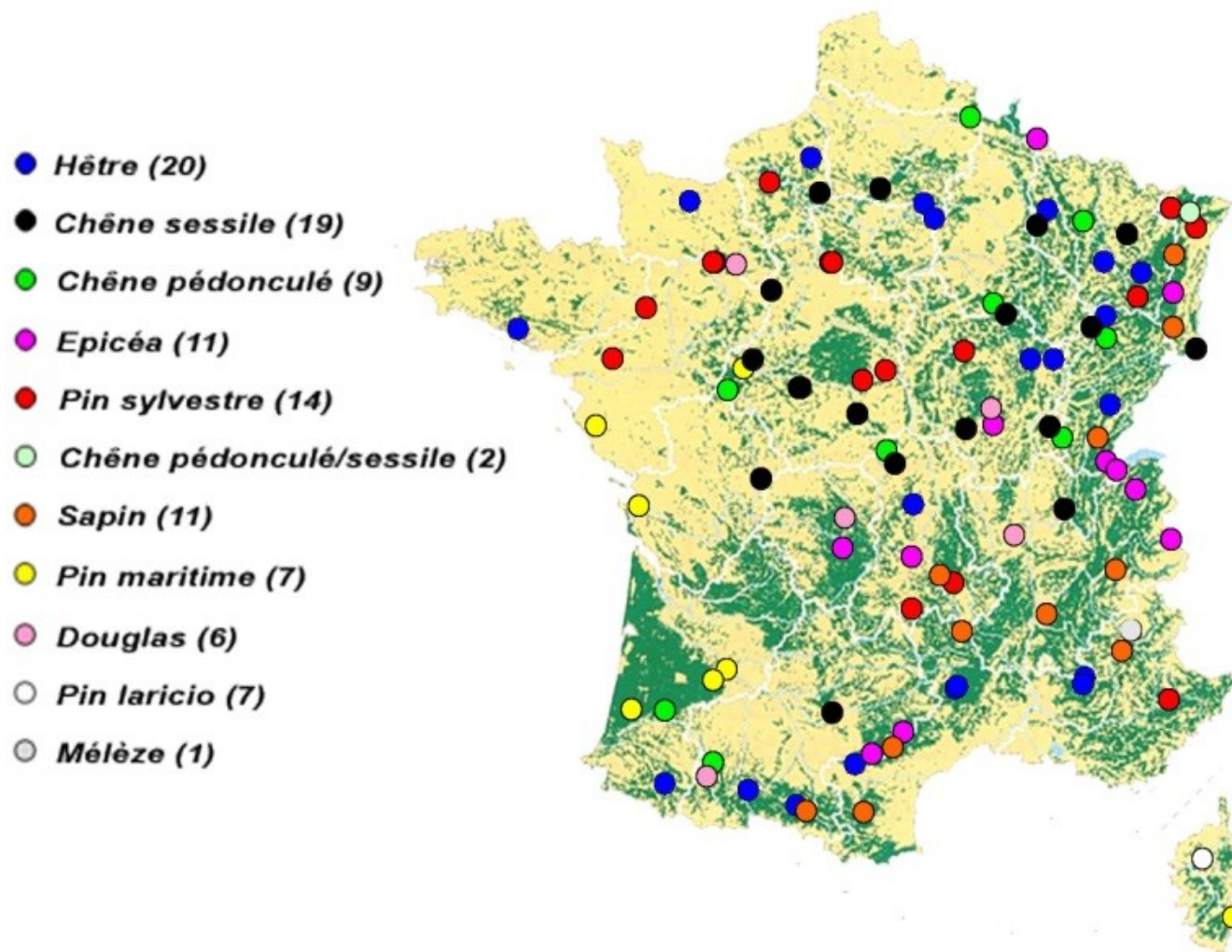
SER = SylvoEcologicalRegion (determinants of forest growth conditions and habitats)
GRECO = Ecological regions (one GRECO regrouping several SER)



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



Let's open the black box !!

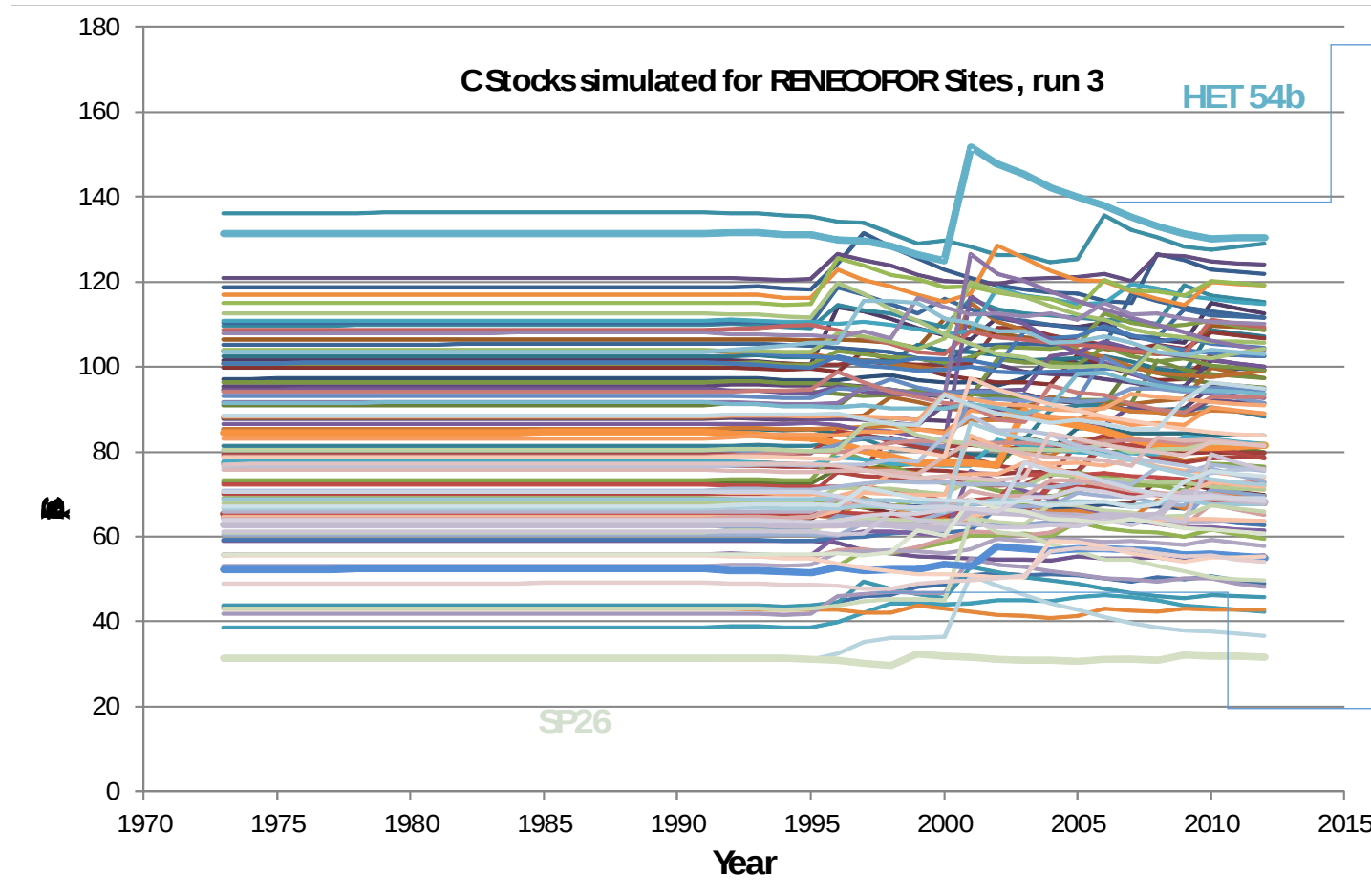


An unique dataset in forest ecosystems

- Cover the main tree species in France
- Aboveground litterfalls measured between 1994-2008 (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.

102 plot of the RENECOFOR Network

Good results in average



Spinup procedure with average climate and litter inputs



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

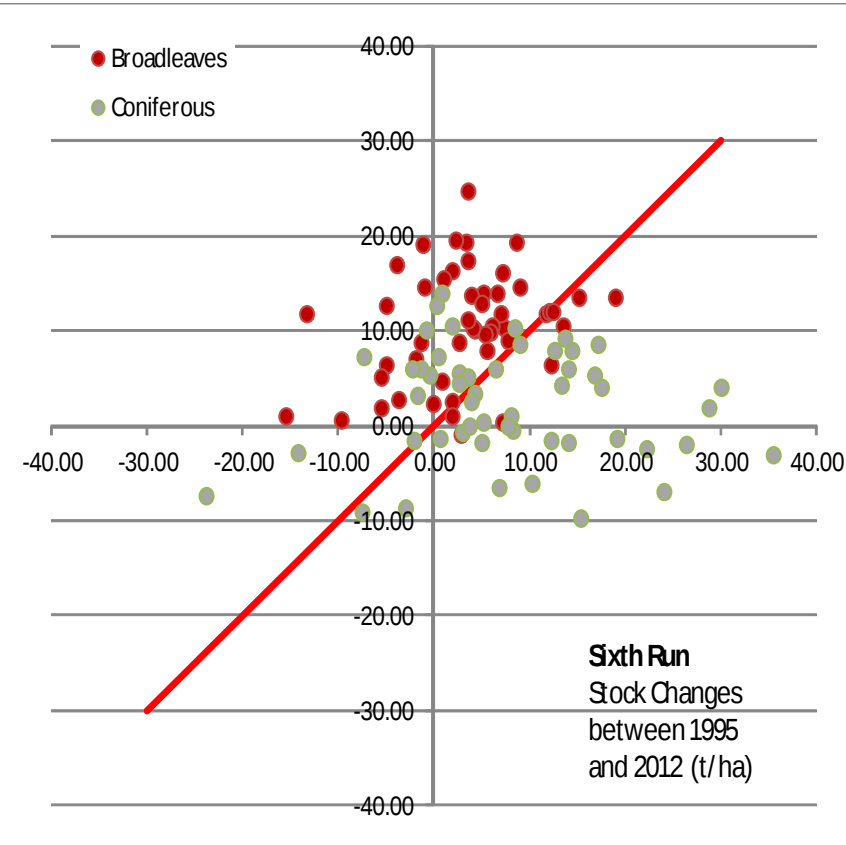
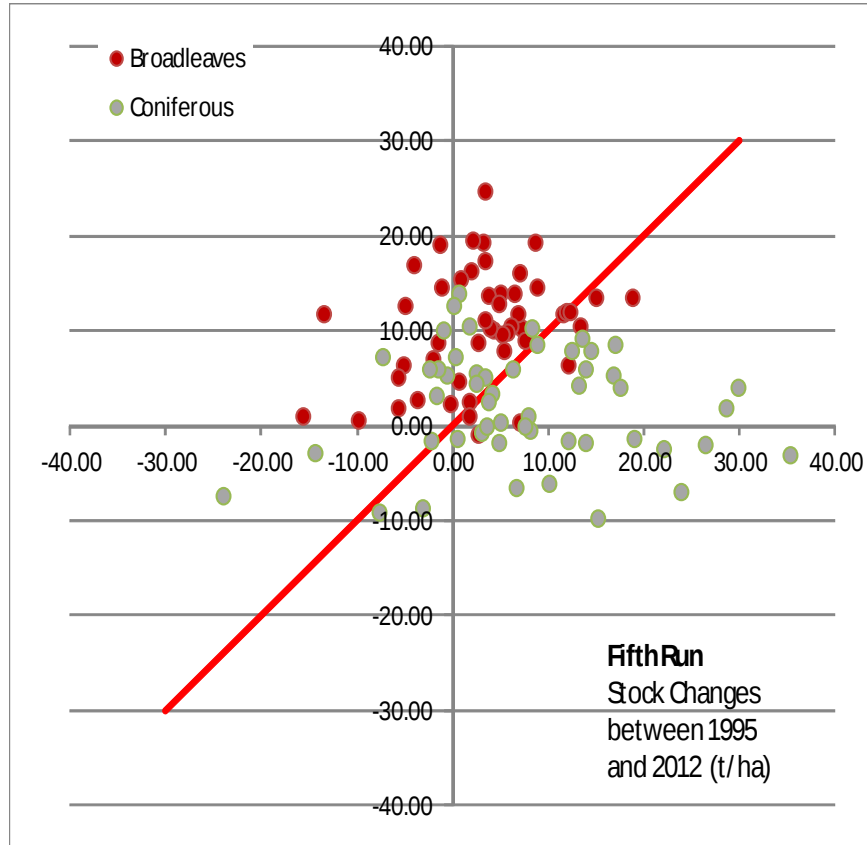
Actual climate and litter inputs (evaluation of the stock changes)



	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.....

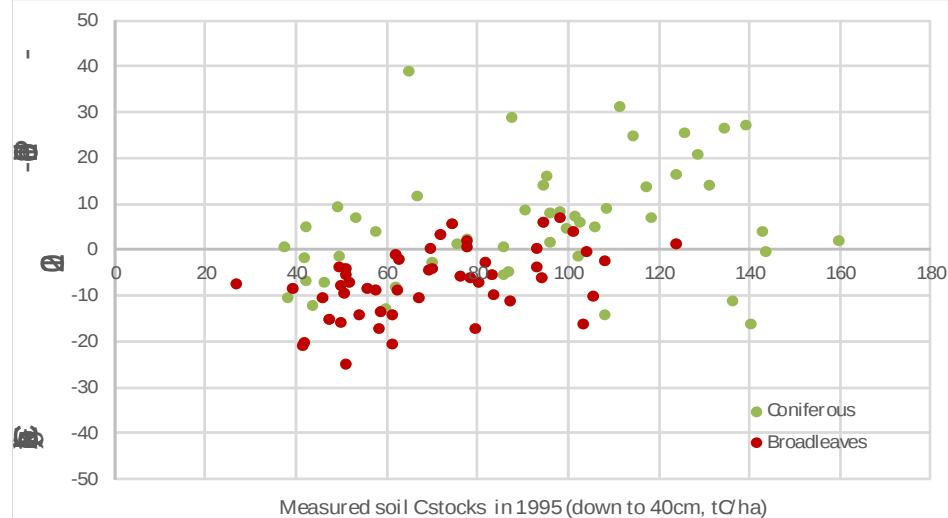
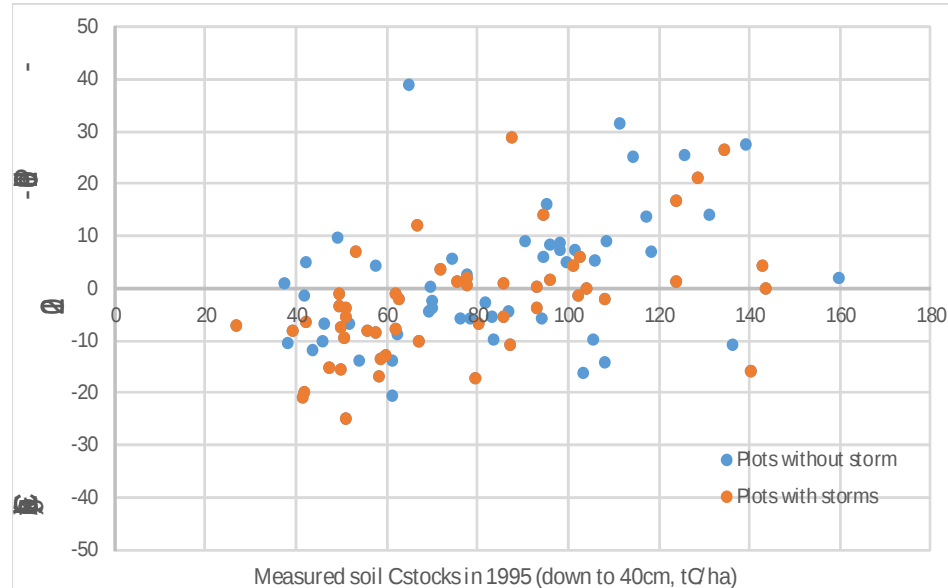
Without
considering
species
biochemistry of
the litters



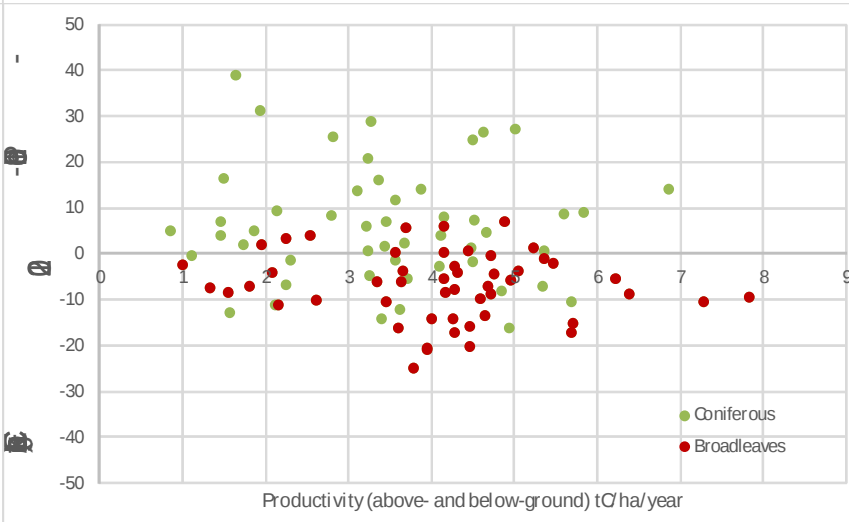
Taking species
specific
biochemistry of
the litters

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 emphasize 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)