Estimating Future Sustainability Indicators at National/Regional Level Using NFI Data: The Impact of Data Aggregation

SENSOR - Impact assessement on Land Use Changes

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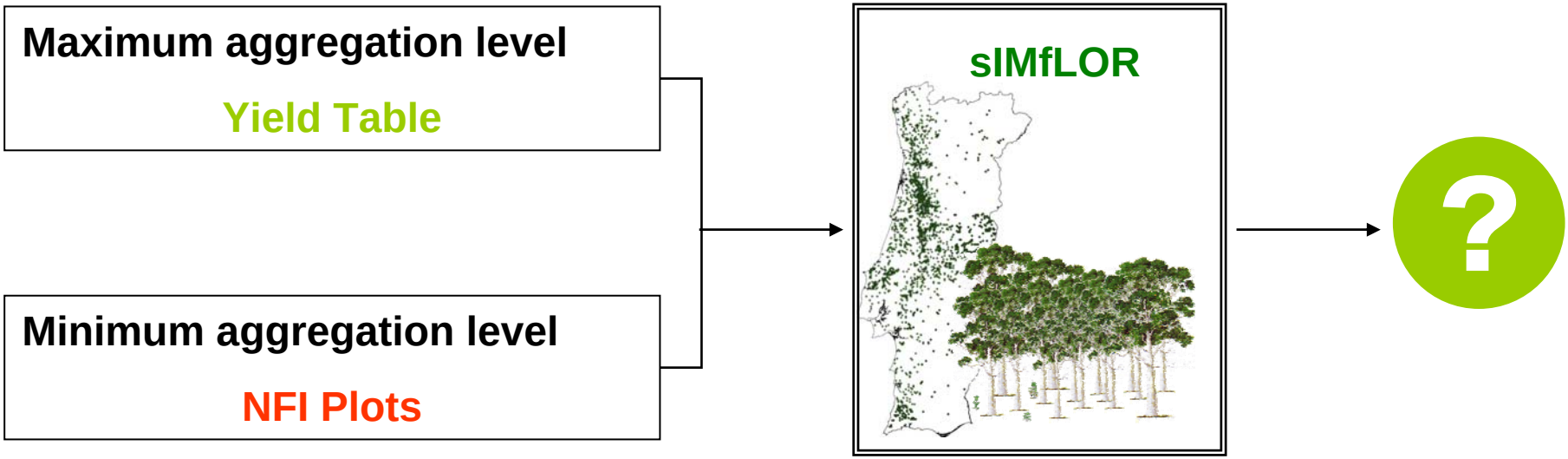
CENTRO DE ESTUDOS FLORESTAIS

EFORWOOD
Sustainability Impact Assessment of the Forestry - Wood Chain

SENSOR

Objective:

Compare 2 different ways of aggregating NFI data to be used as input for a forest regional simulator - sIMfLOR



- Areas from NFI 1995-1998:
  - Industrial stands
    - Pure even-aged (PEA) by age class (t<=12 years)
  - Non-industrial stands
    - Pure even-aged (PEA) with t>12 years

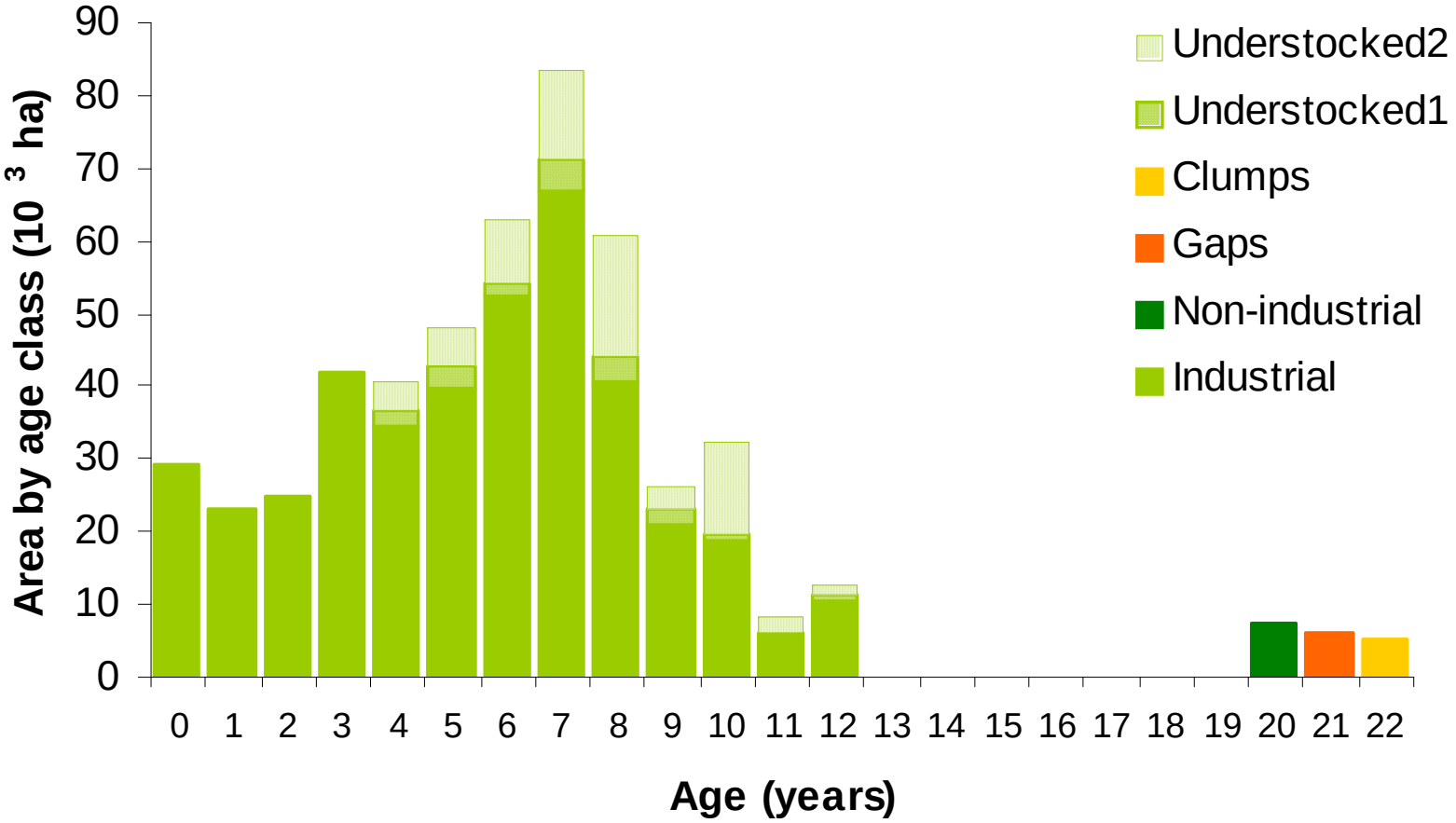
Data:

Data source: 1995 NFI

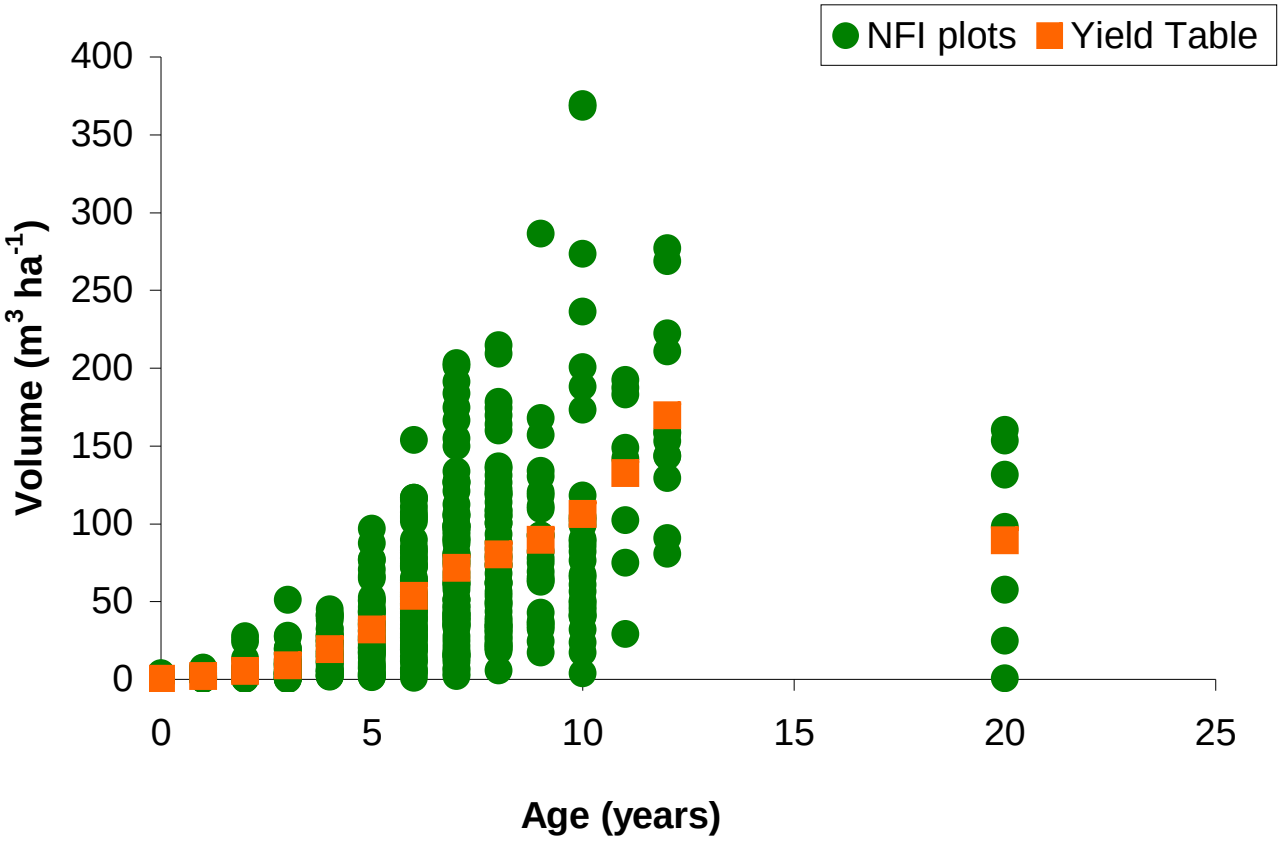
Area pure even-aged stands: 513439 ha

Number of plots: 491 PEA

Standing volume: 52.28 (10^6 m^3)



- Yield table for PEA stands
  - Build to “reproduce” volume stock of PEA estimated from NFI
- NFI plots of PEA stands
  - Each plot was simulated individually



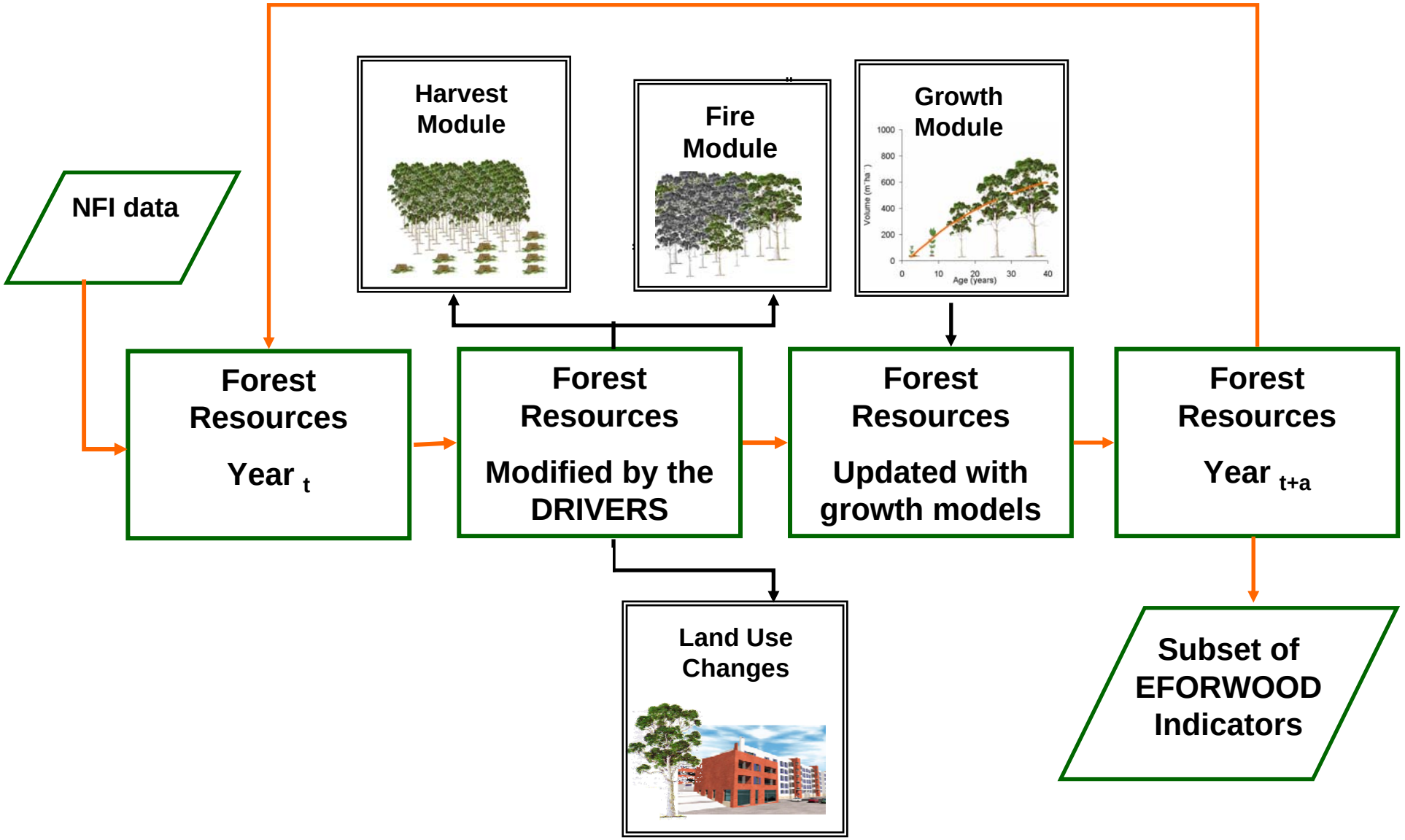
slMfLOR forest simulator – present drivers:

- Wood Demand – Harvest Module
  - Annual harvest (VHarvest)
  - % of harvest from non-industrial stands (%HarvNI)
  - Minimum age for final harvest (tminHarv)

- Hazards Occurence – Fire Module and Pests Module
  - Area burned per year (Afire)
  - Minimum age that allows industrial use after a fire (tminFire)
  - % of burned area harvested for industrial use (%UseFire)

- Land Use changes – LUC Module
  - New areas planted every year (ANewPlant)
  - % of area abandoned every year (%LandChange)

sIMfLOR forest simulator - structure:



sIMfLOR forest simulator – alternative scenarios

- **Scenario 2**

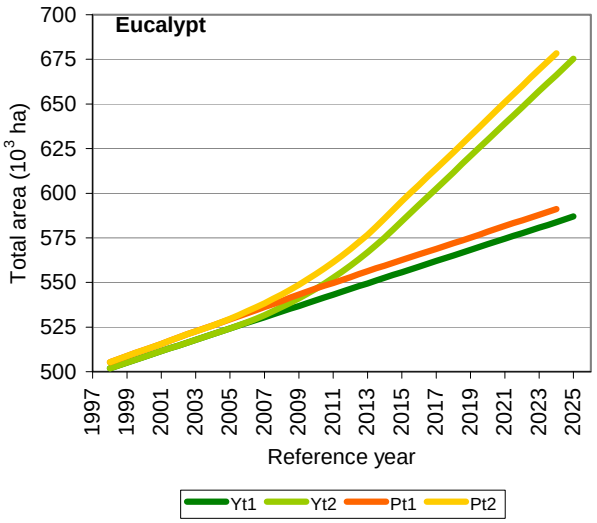
Initial year of the projection:	1997
Years to project:	28
tminHarv:	8
tminFire:	5
%UseFire:	0.6
%HarvNI:	0.1

Year	VHarvest	AFire	ANewPlant	%LandChange
1997	3524	4817	3800	0.0012
1998	3891	2353	3800	0.0012
1999	3985	7326	3800	0.0012
2000	4222	4837	3800	0.0012
2001	4618	6954	3800	0.0012
2002	5312	30526	3800	0.0012
2003	5593	6054	3800	0.0012
2004	6083	20000	3800	0.0012
2005	**5938**	**7000**	**3800**	**0.0012**
2006	5938	7000	3800	0.0012
…	…	…	…	…
2014	5938	7000	3800	0.0012
2015	**5938**	**7000**	**3800**	**0.0012**
2016	5938	7000	3800	0.0012
…	…	…	…	…
2024	5938	7000	3800	0.0012
2025	**5938**	**7000**	**3800**	**0.0012**

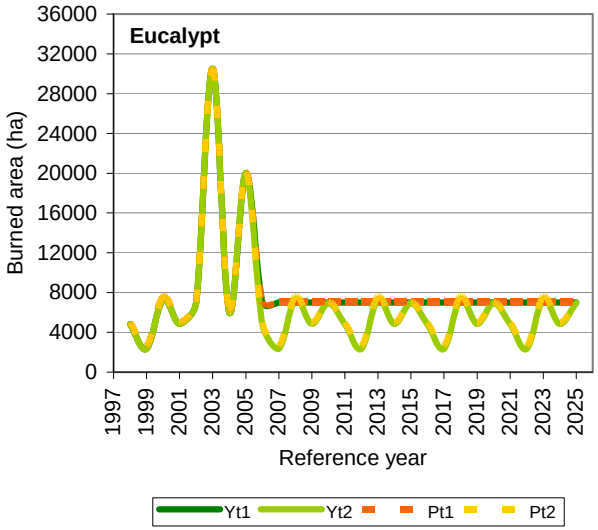
Scenario 2 tries to increase carbon stock

Summary of scenarios 1 and 2:

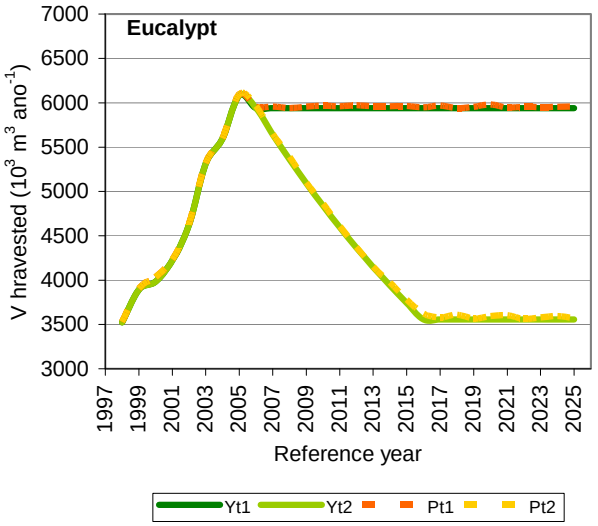
ANewPlant



AFire



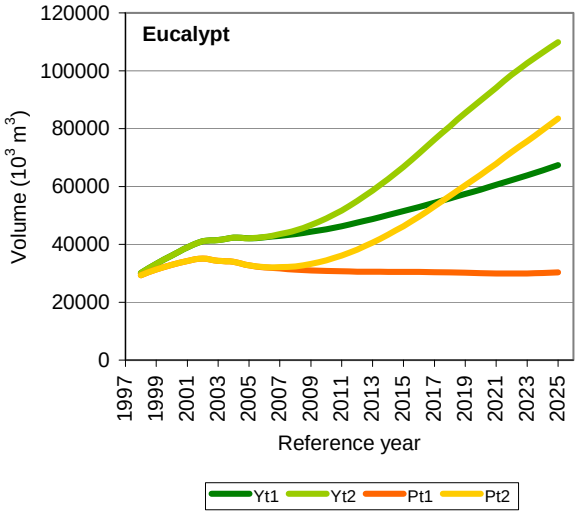
Vharvest



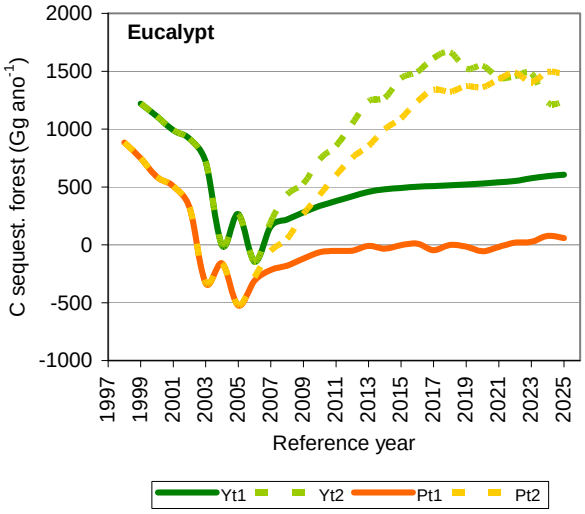
- ANewPlant – 10% increase from 2005 to 2014 stabilizing afterwards
- AFire – variation inspired in past occurances having eliminated the most serious fires
- Vharvest – 0.05% decrease from 2007 to 2016 stabilizing afterwards

Indicator calculus:

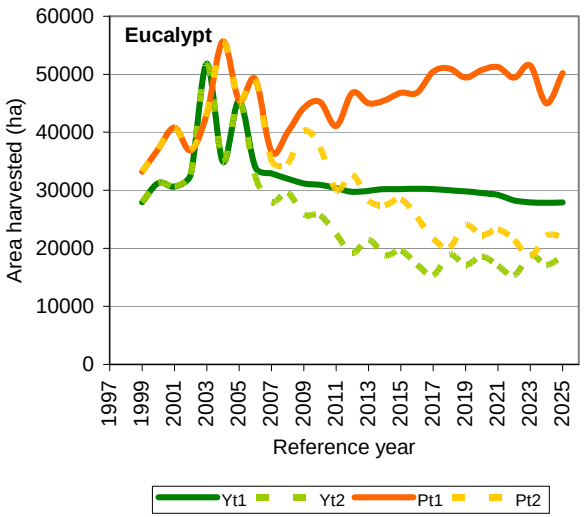
PEA Volume



C sequestered

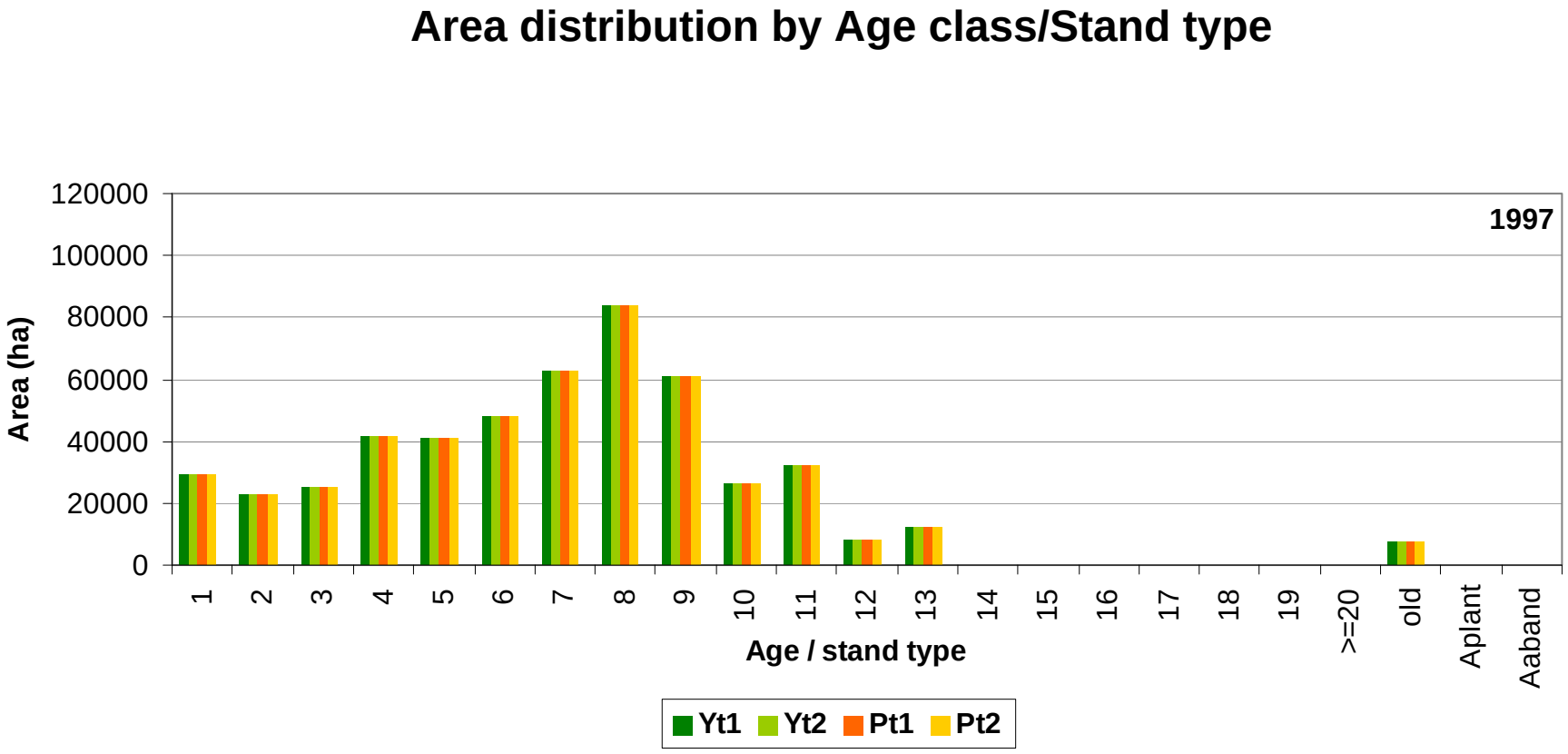


PEA Harvested

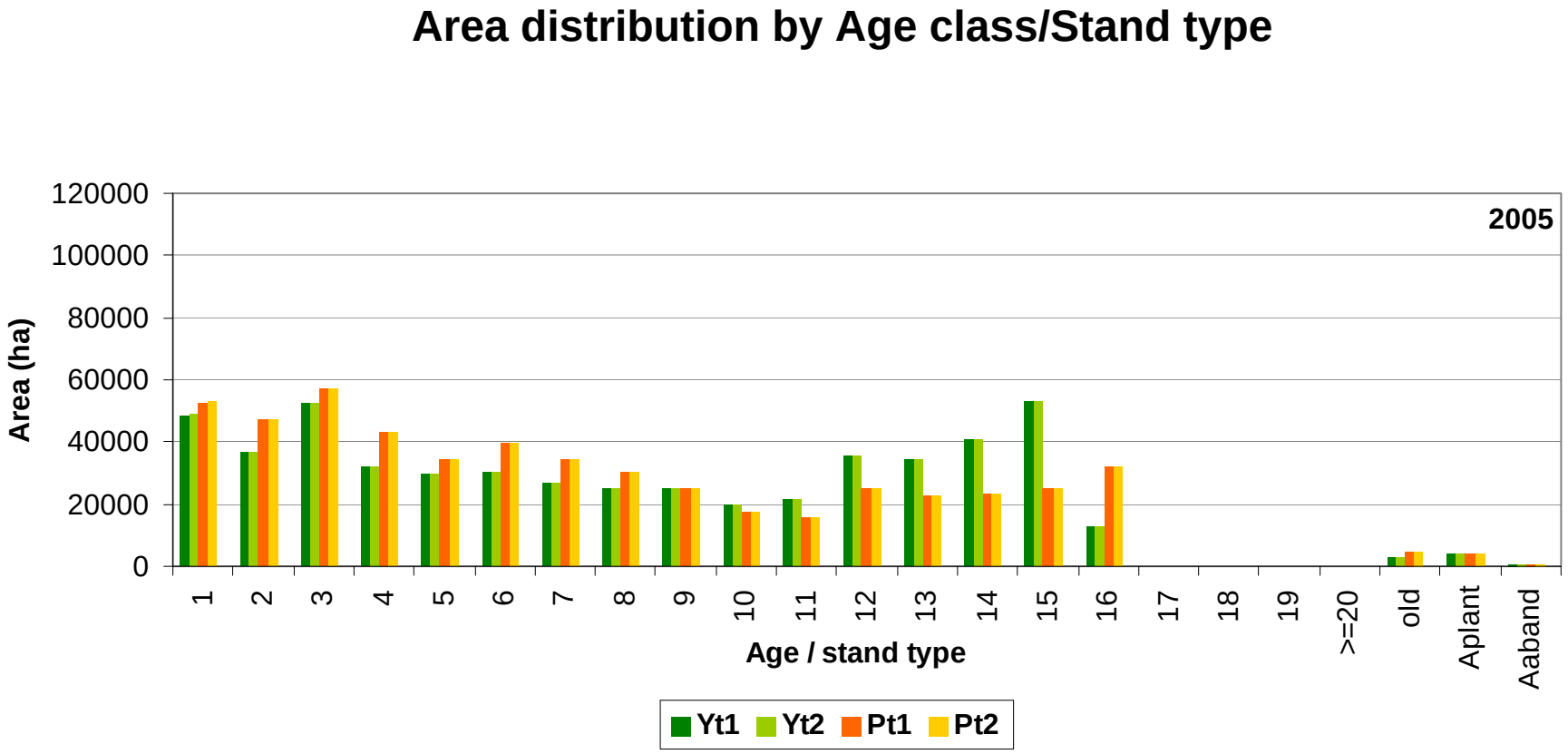


– Even though the simulators behave with the same tendency sIMfLOR_YT harvests less area leading to higher volume stocks

Indicator calculus:

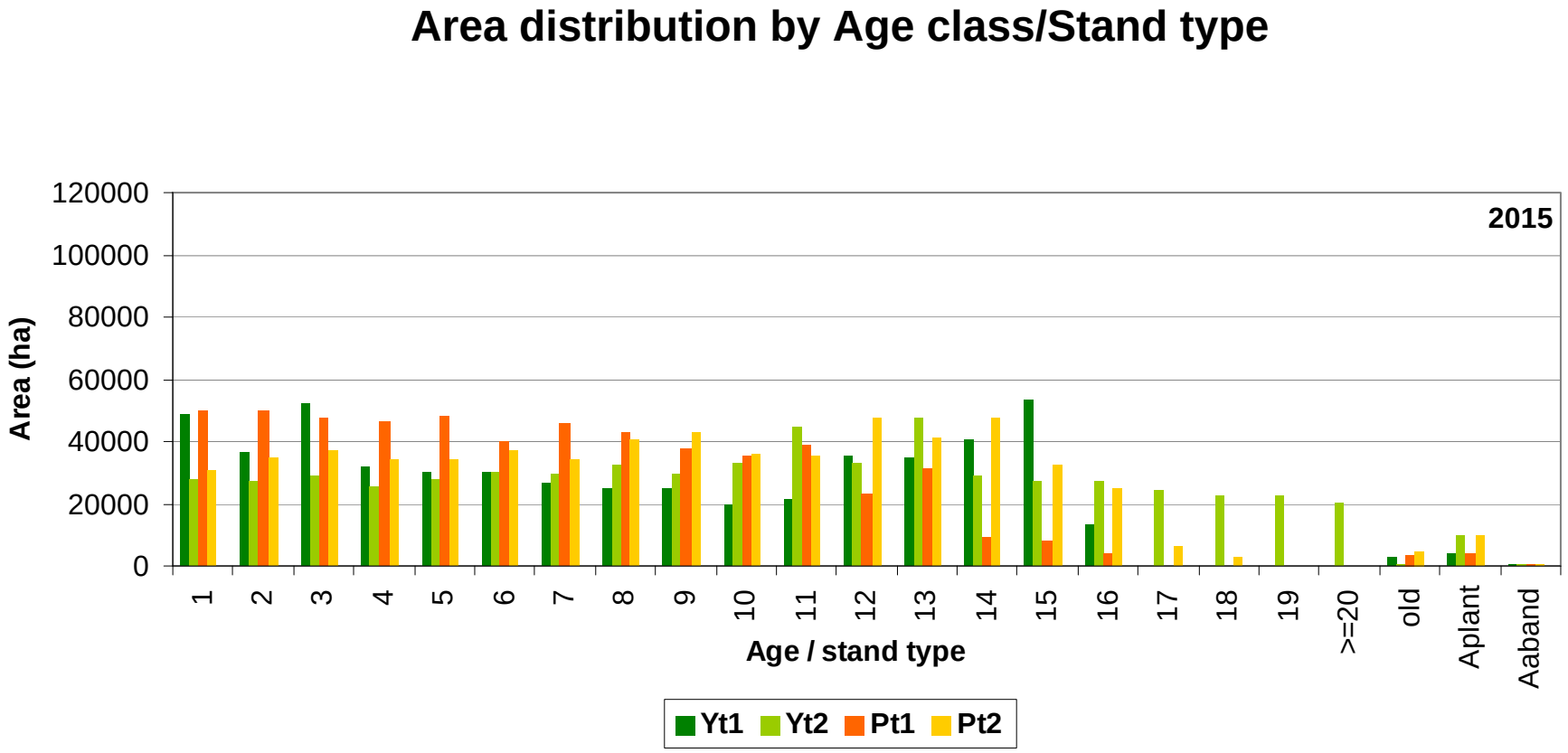


Indicator calculus:



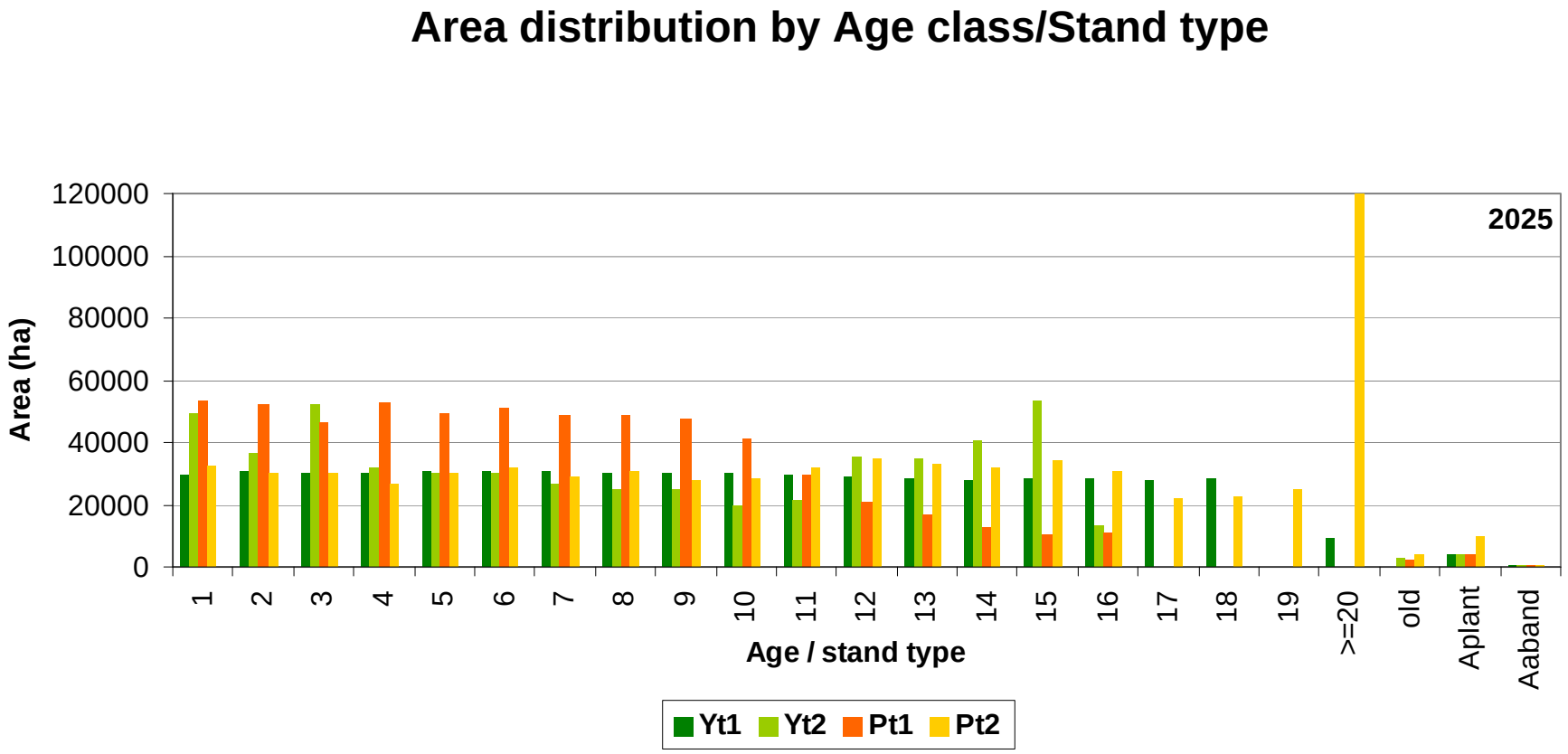
Results of simulations – EFORWOOD base year 2005

Indicator calculus:



Results of simulations – EFORWOOD year 2015

Indicator calculus:



Results of simulations – EFORWOOD year 2025

Explaining the differences between the results:

- 1st Hypothesis – Harvest Modules not compatible
  - sIMfLOR_YT gives 100% priority to old stands
  - sIMfLOR_PT gives an increasing priority as stands grow older

  Different harvesting criteria have a great impact but don't explain the whole difference.

- 2nd Hypothesis – Understocked plots
  - sIMfLOR_YT dilutes them when averaging volumes per age class
  - sIMfLOR_PT grows the plots until they're harvested

  When understocked plots are harvested the impact is greater in terms of harvested area than in terms of harvested volume. New industrial stands will never be understocked.

Explaining the differences between the results:

- 3rd Hypothesis – Different ways of accounting Merchantile volume (with and without bark)
  - This resulted in the aplication of a conversion factor
- 4th Hypothesis – Data aggregation itself
- 5 th Hypothesis – Use of 2 different versions of the growth model

Remark:

- Yield tables provide reasonable results for short term simulations

On going research:

- Include new modules:
  - Pests Module
  - FMA's change Modules
- Develop growth model for uneven-aged stands
- Develop growth model for mixed stands
- Simulate the EFORWOOD scenarios for reference futures A1 and B2
- Develop methodology to add more socio-economic and environmental indicators
- Next steps:
  - Update the growth model used by sIMfLOR_YT
  - Validate the simulator with the NFI2005 data