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Future-oriented integrated management of European forest landscapes

INTEGRAL

FUTURE-ORIENTED INTEGRATED MANAGEMENT OF EUROPEAN FOREST LANDSCAPES

CAQSIS - April 2014

EUROPEAN COMMISSION

COOPERATION

Christophe Orazio, Rebeca Cordero (EFIATLANTIC)
Baptiste Hautdidier, Céline meredieu, Patrick Vallet, Christian Pilaar, François de coligny and IRSTEA team

Modelisation d‘un paysage de 100000ha selon plusieurs scenarios à l‘aide de SIMMEM

Integral modelisation work in France

Content

- Project overview
- Input data
  - Stand data
  - Forest owner behaviour data
    - Forest ownership (types)
    - Mangement options
    - Scenario
- Simulations with SIMMEM
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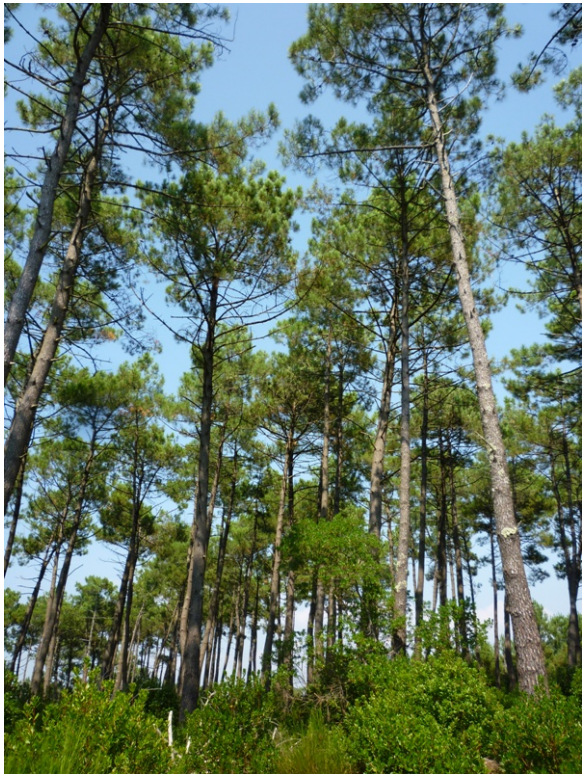
  - Evolution
- Outputs
- Conclusion



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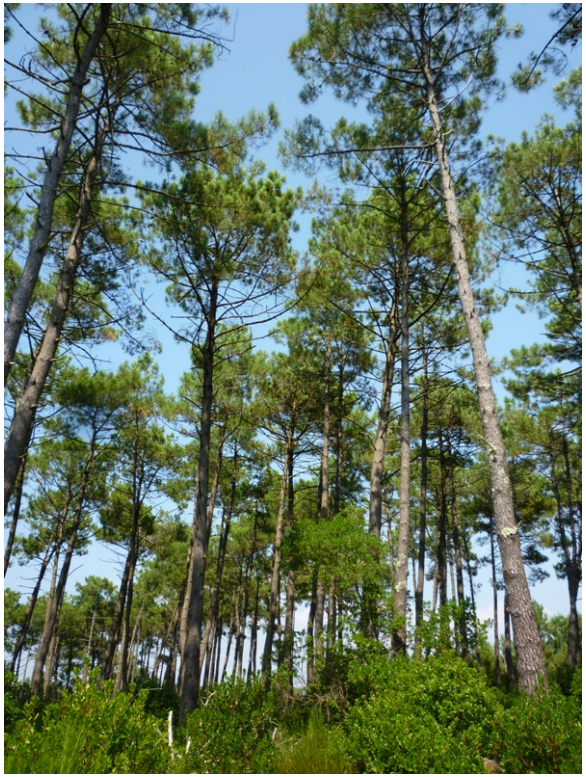
Integral modelisation work in France

Project overview

- Analyse in a quantitative way potential impact of policies on a landscape and identify more robust policies for sustainable forest management
- 20 case studies in Europe
- 1 In France
- 2 technical WP
  - WP 2 : ecosystem services and landscape modelisation
  - WP3 : Policy assessment, forest owners behavior and backcasting



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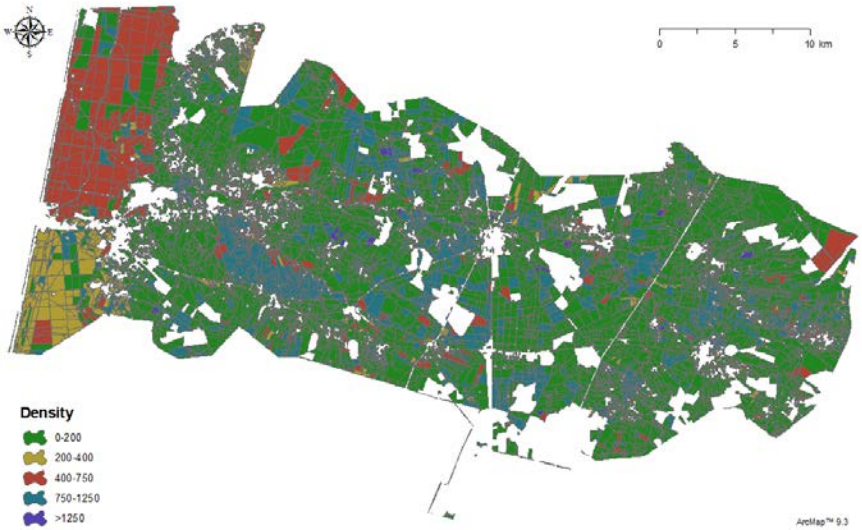
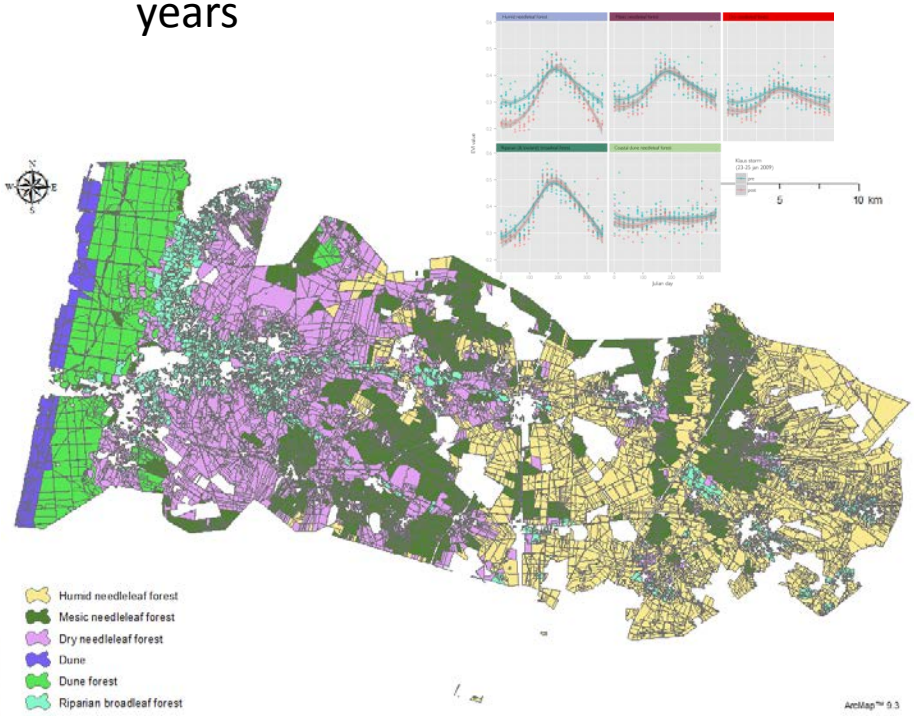
Integral modelisation work ir
Input data / Stand data

- Poor NFI data available (only Pine/oak)
- Photo interpretation on 80% of the area by Rebeca
- MODIS long term series analysis from february 2000 to january 2014 – Kmeans algorithms on vegetation indices over years





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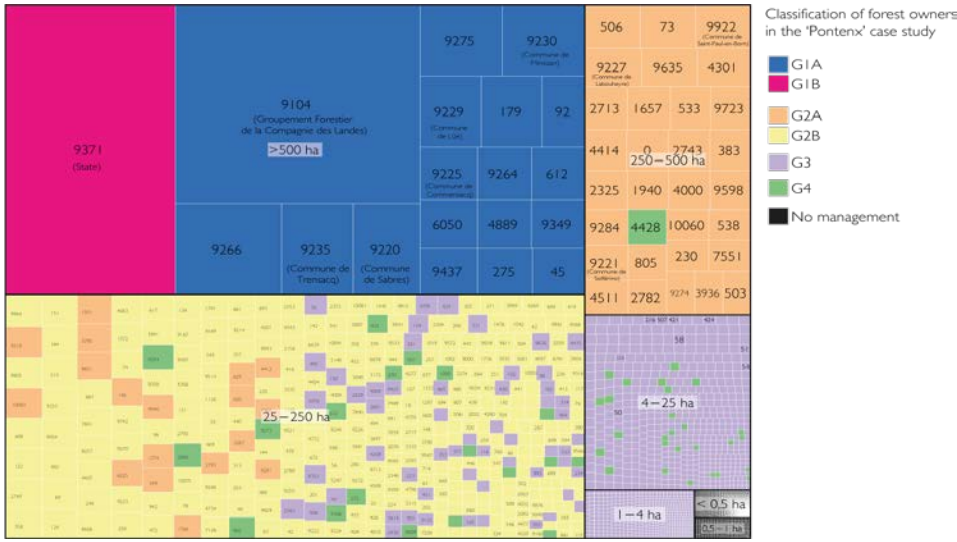
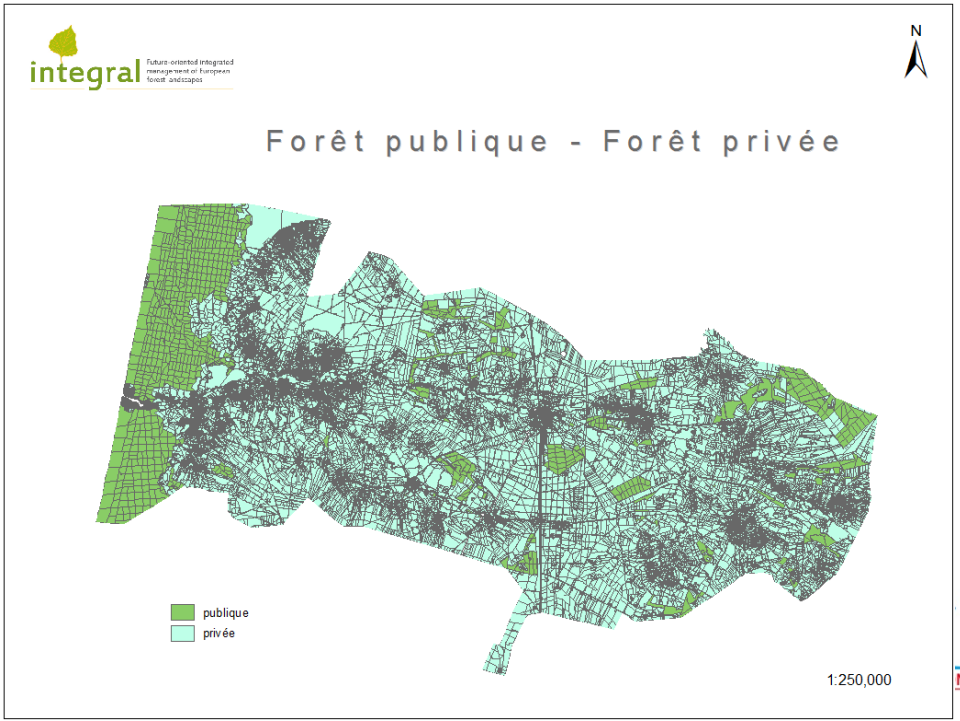
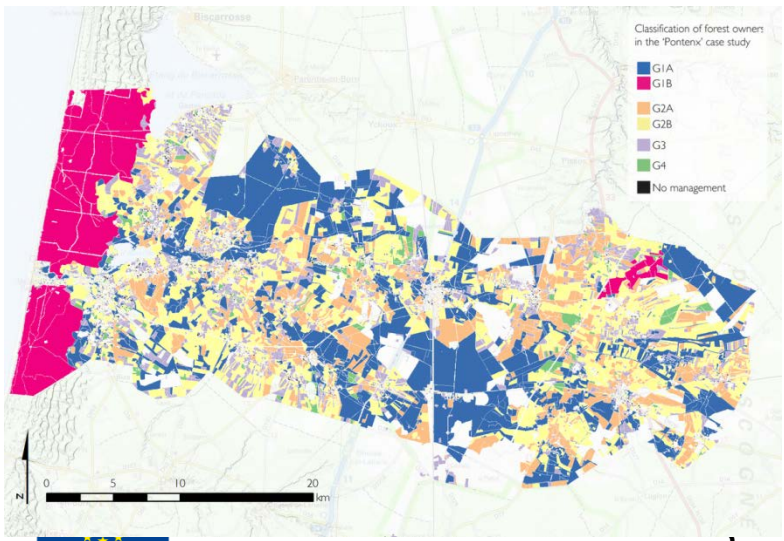
Input data / Forest ownership

- Cadastre provide all owned parcels
- Social science interview and FORSEE work provide forest owner types
- Stratified Random sampling provide **forest owners types** spatial map







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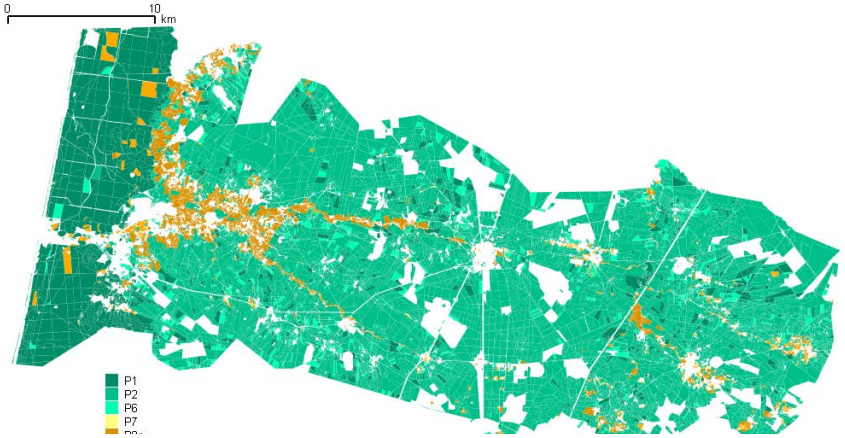
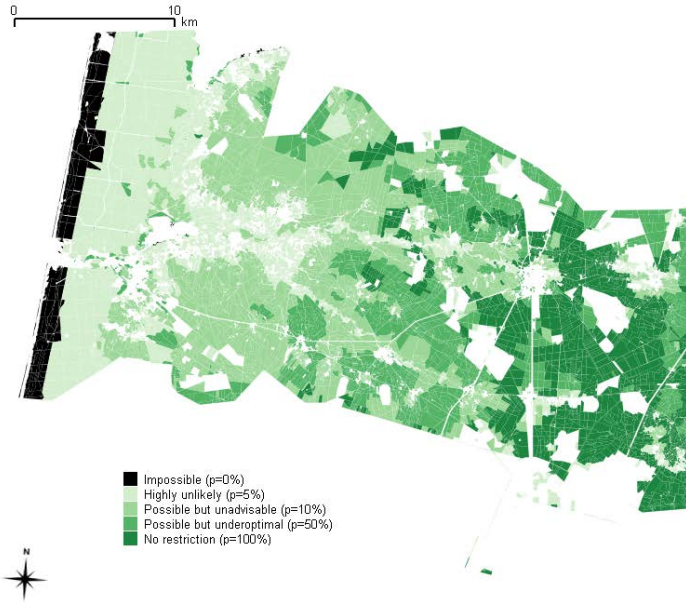
Input data / Forest management options

- Management options are identified based on actual recommendations
- They are spatialized according to existing stand
- For new management options suitability maps are used in the random sampling



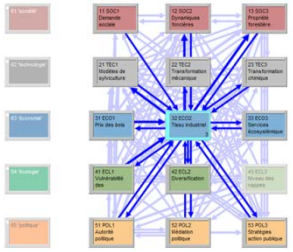
Pontenx pilot zone management options

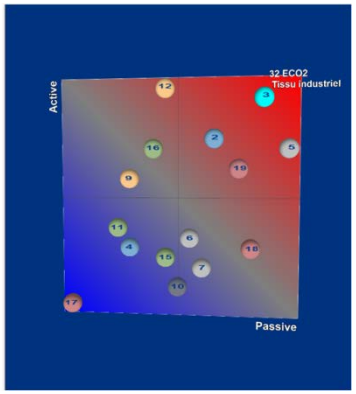


Scenario name	P1- MP High quality	P2- PM Standard classic	P3- Short-term	P4 PM- Half-dedicated to biomass	P5 PM-Biomass	P6- No management	P7 : Eucalyptus *! no model in DSS at the moment ? DISCUSSION WITH FCBA to include a model in CAPSIS on January 2014	P8a : Riparian
Objective	High quality timber >1,5m3	Timber 1 to 1,2 m3	Small timber 0,3 to 0,4 m3	9 years-biomass (30t/ha) 35 years timber BO (1 m3)	Biomass70 t/ha	Timber 1 to 1,2 m3	pulp, particle and fibre board	Timber
Site preparation (fertilisation alter site index)	No ploughing. Round up. Broadleaf trees preservation	Full ploughing. Fertilization	Full ploughing. fertilization	Full ploughing. NO fertilization	Stump removal, full ploughing,. fertilization, drainage	Full ploughing. No Fertilization	Sub-soiling; fertilization at plantation	No
Stand composition	Maritime pine, broadleaves preservation, diversified wooded undergrowth	Even-aged single species forests	Even-aged single species forests	Even-aged single species forests	Even-aged single species	Even-aged single species forests	Even-aged; single species forests	Even-aged; si species fores
Genetic material *! change in site fertility	No	Genetically improved plants	Genetically improved plants	Genetically improved plants	Genetically improved plants	Genetically improved plants	Genetically improved plants	Natural regen
Regeneration type *! only density is considered by DSS	Natural regeneration-1400 stems/ha after clearing	Plantation 1250 stems/ha	1250 stems/ha	2500 stems/ha (2*2m, 1 row biomass, 1 row timber)	3000 stems/ha	Plantation 1250 stems/ha	Plantation 1250 stems/ha (for Portugal) 1600 stems/ha (for Galicia and Asturias)	$$VOIR
Cleaning/ Clearing/ Weed control *!	Rack creation. Cleaning 1 row /2, with diversified undergrowth, 1 time every 3 to 5 years after rack creation. 2 clearings	Full cleaning once a year during 5 years (every 5 years) after	2 cleanings	Silvicultural maintenances between 9 and 30 years	No practices	First cleaning	High forest: during 1st yr after plantation manual weed control around seedlings; mechanical weed control at yrs 1 and 3 Coppice stands: mechanical weed control at yrs 3 and 5 /2 brush mechanical, chemical or with cattle eradication and crushing without burring rests to avoid	No

Integral modelisation work in France
Input data / Forest owners behaviour

- Scenarios are built from main drivers identified by experts and stakeholders
- From scenarios we know evolution of demand and incentives
- Matrix of forest management per forest owner types are built for each scenario





4.4.3.4 Scenario 1: Unfinished bioenergy

Table 13 4.4.3.5 Scenario 2: Biorefinery innovation & land-use tensions

Table 14: 4.4.3.6 Scenario 3: The European biomass sink

Tab 4.4.3.7 Scenario 4: The 'Green' innovative cluster

4.4.3.8 Scenario 5: The territorial partnership

Table 17: Behaviour matrix in Pontenx for driver scenario 5

		% of area under management prog						
Owner type	% of total area	P1	P2	P3	P4	P5a	P5b	P6
G1A	25	21,2	64,9	-	-	-	-	-
G1B	15	70,5	18,9	-	-	-	-	1
G2A	20	24,1	54	-	-	-	-	3,
G2B	20	25,6	53,3	-	-	-	-	1,
G3	*12*	14,6	27,3	-	-	-	-	30,
G4	8	9,2	55,8	-	-	-	-	5,
Sum	*100*	*31,4*	*46,7*	*0*	*0*	*0*	*0*	*4,*

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Simmulation with SIMMEM/ Initialisation

- Lemoine dune and fagacee are able to initialize from Density, age fertility without Ddom and DG
- Poor knowledge of fertility on oak
- It was necessary to build initialisation curves to estimate Dd and Ddoms on stand plateau
  - Accurate for young ages
  - Row estimate on old ages (fertility not considered – can be improved)

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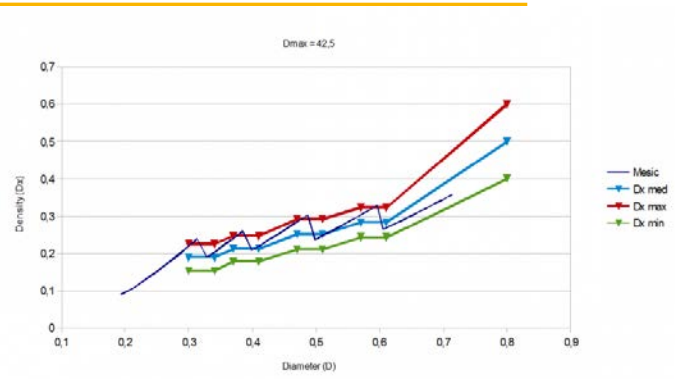
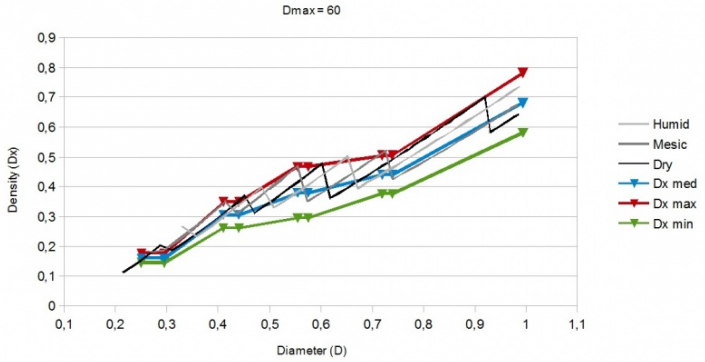
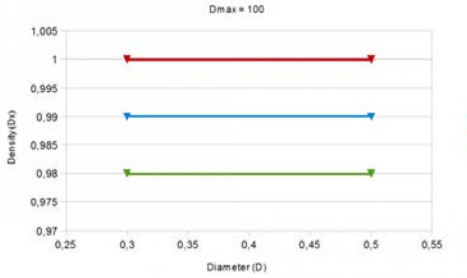
Integral modelisation work in France
Simmulation with SIMMEM/evolution

- Verbal description are translated into yield table using CAPSIS
- Problem to set up relative density from french publication (Portuguese RDI used)
- Quite tricky to build curves Ddom/Rdensity for each yield table
- Good tools : minimum interval between thinning + max clear-cut area a year (we used 10%)



Ddor					000	0,000
Dens					000	-200,000
Interval	0,064	0,080	0,000	0,076	0,000	0,000
Densité01med	0,247	0,272	-200,000	0,285	-200,000	-200,000
Ddom E4	0,547	0,604	0,000	0,538	0,000	0,000
Densité01max	0,306	0,335	-200,000	0,340	-200,000	-200,000
Interval	0,061	0,074	0,000	0,071	0,000	0,000
Densité01med	0,275	0,298	-200,000	0,305	-200,000	-200,000
Ddom E5	0,723	0,720	0,000	0,591	0,000	0,000
Densité01max	0,410	0,362	-200,000	0,320	-200,000	-200,000
Interval	0,110	200,362	0,000	0,063	0,000	0,000
Densité01med	0,355	-99,819	-200,000	0,286	-200,000	-200,000
Données sylviculture						
Paramètre modèle de croiss	LEMOINE	LEMOINE	LEMOINE	LEMOINE	LEMOINE	LEMOINE
FERTILITE (hdom 40)	19	19	19	22	22	24,5
N ini	1250	1250	1250	2500	2500	1250
Age ini	11	11	11	11	11	11
Cdom	36,51	36,51	36,51	22,84	37,20	30,27
Cg	26,73	26,73	26,73	37,20	22,84	33,27
Min entre éclaircies observé	5	5	33	4	18	0
avantE1_Age	18	19	18	18	18	
avantE1_N	1250	1250	1250	2500	2500	
avantE1_Dg	13,02	15,12	13,02	10,91	12,02	
avantE1_Ddom	16,98	19,62	16,98	17,25	18,99	
avantE1_Vu	0,054	0,086	0,054	0,046	0,063	
	820	800	700	1250		
	3,85	16,11	14,07	12,57		
	6,98	19,62	16,98	17,25		
	,061	0,978	0,631	0,061		
	21	24	33	20		
	820	800	700	1250	0	0
	7,82	19,65	25,58	15,69		
	1,55	23,82	30,44	21,42		
	,131	0,177	0,372	0,116		
	580	550		800		
	8,58	20,57		16,97		
	1,55	23,82		21,42		
	,142	0,194		0,136		
	28	32		26		
	580	550	0	800	0	0





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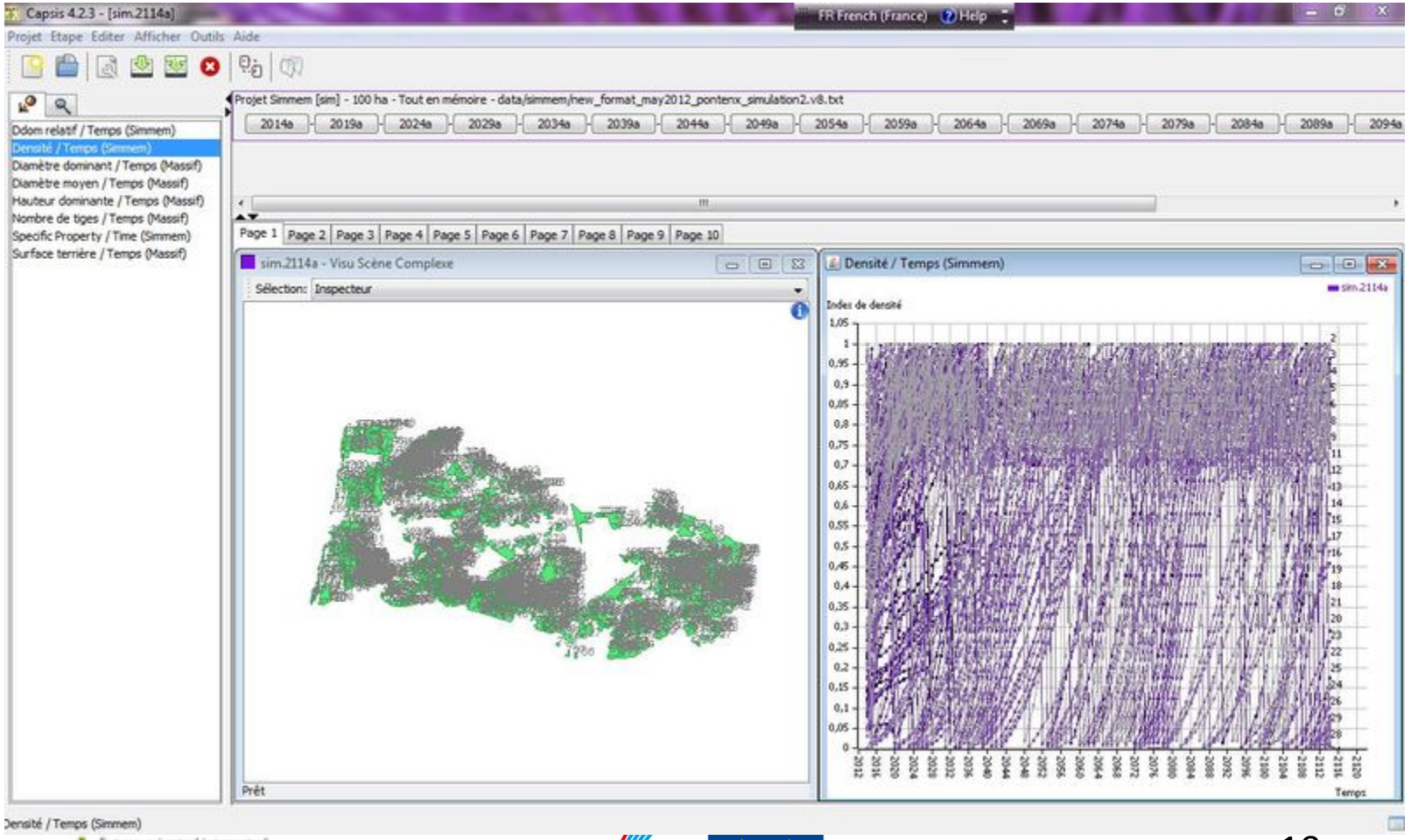
Then we run simmem

But you all now that! We moved from 10hours to 10 minutes!



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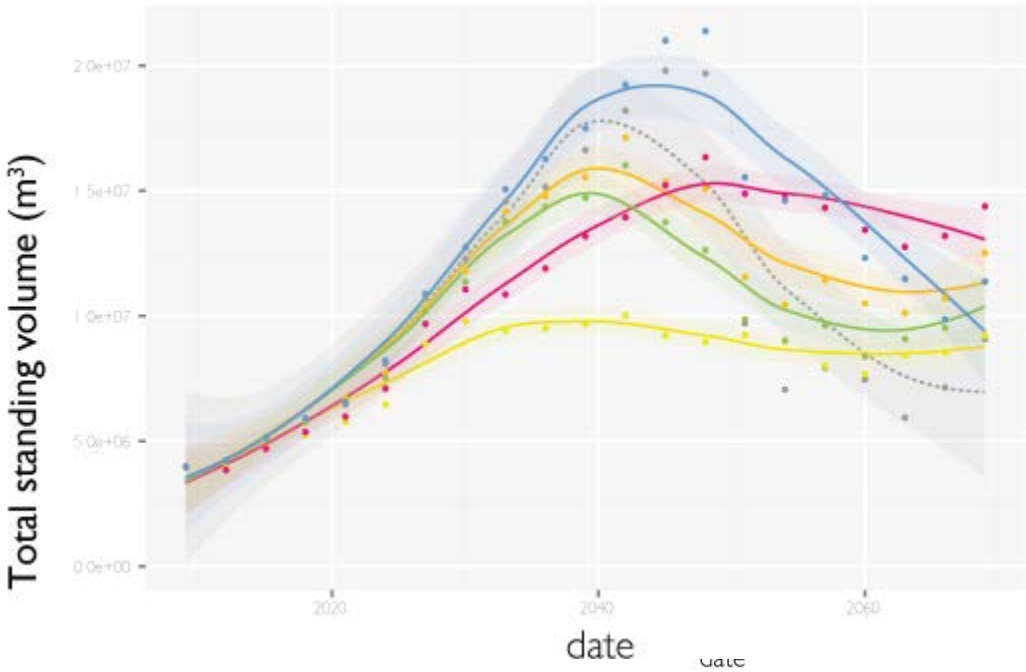
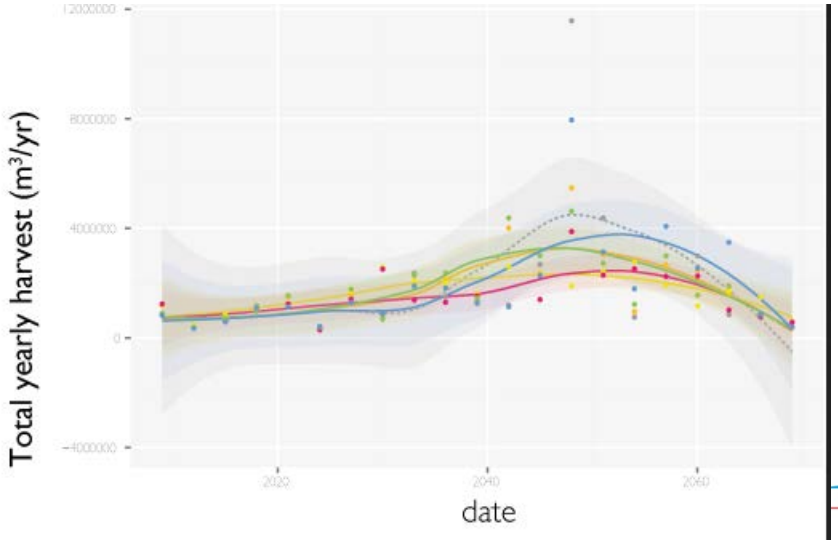
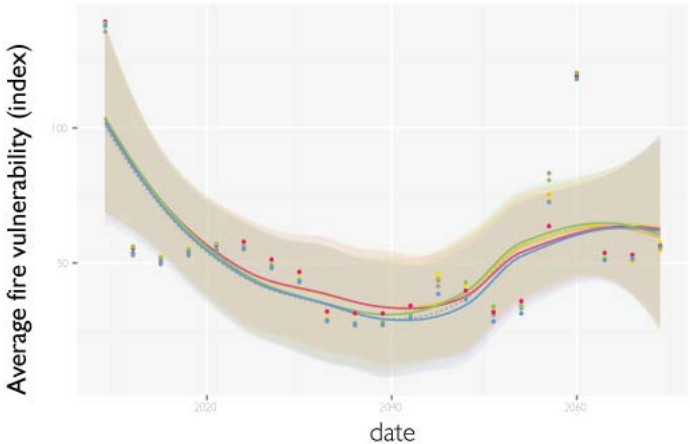
Simmulation with SIMMEM/Outputs

- Standard models outputs :
  - Age, height, diameters, ..
  - Volume, C, date from last thinning
- Additional indicators from wrapper
  - Standing value, …
  - Fire risk index, stability index, ..







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Conclusion

•SIMMEM allows to run many CAPSIS models on the same landscape in an efficient way.
•From outputs, we could easily illustrate trade-offs between services and options
•Good collaborative tools – strong inputs from IRSTEA
•Improvement needed for INTEGRAL :
- Fix wind stability index pb
- Increase cover of input data to 100%?
- Add eucalyptus and black locust?
- Validate some of derived indicators.

•Good points from landscape approach :
- Landscape constraints : total harvested area
- Spatialised outputs

•Promising tool:
- Switch from a species to other after plantation
- Have simulation on one plot influenced by others for risk assessment…!