



The 10th Capsis Meeting

June 17th 2008 - Montpellier

Capsis progress since 2007



François de Coligny

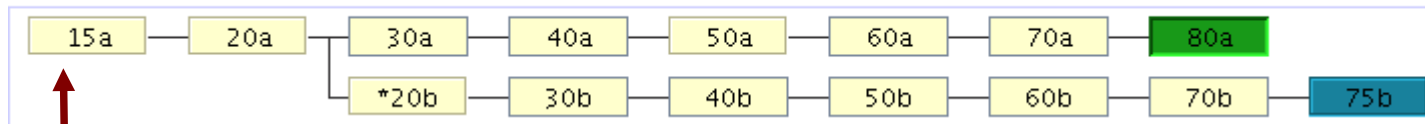
INRA - AMAP

botAnique et bioinforMatique de l'Architecture des
Plantes

The Capsis project

Objective : To build a **software platform** to integrate **forestry growth / dynamics models** for modellers, forest managers and education.

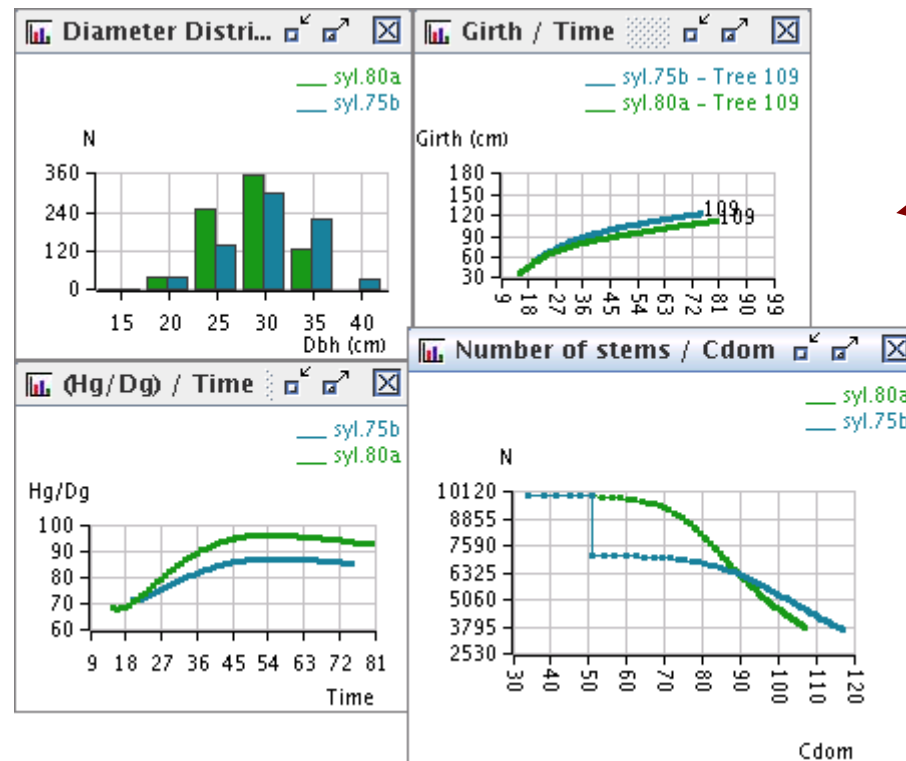
Name : syl - Model : Pin laricio - 5 ha - All in memory - virtual stand



Initial situation

Intervention

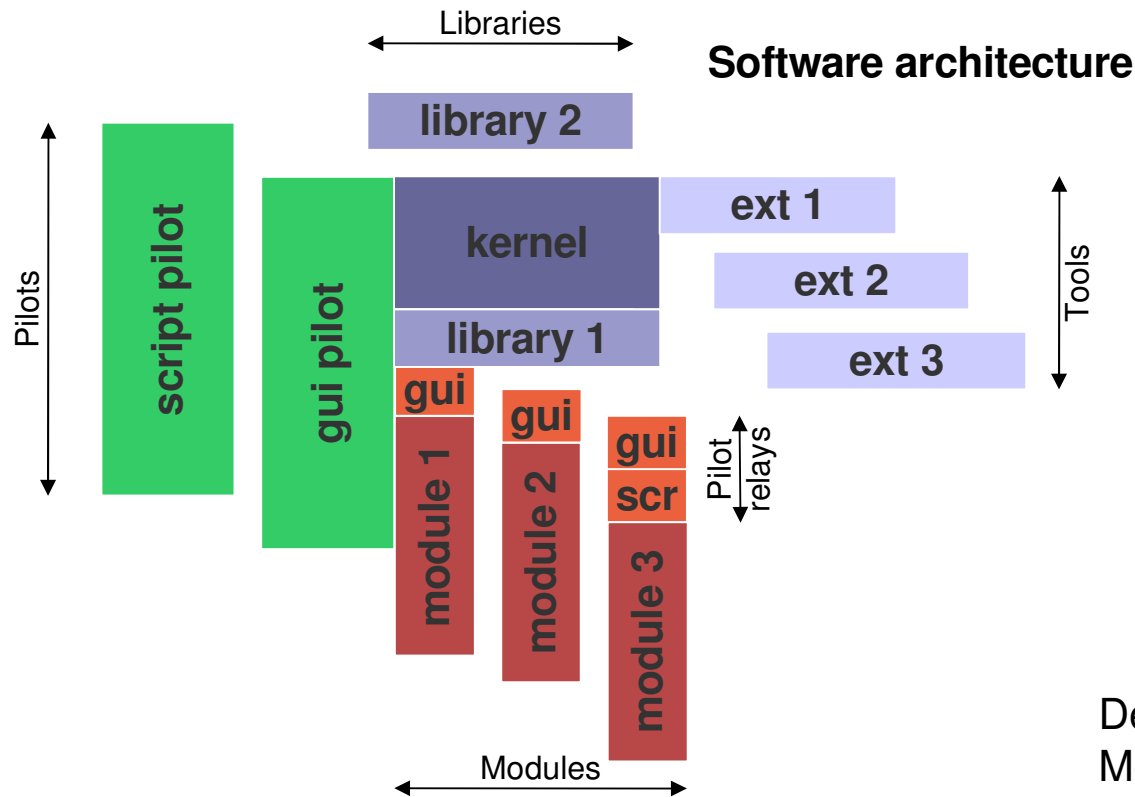
Scenarios



Integrated outputs

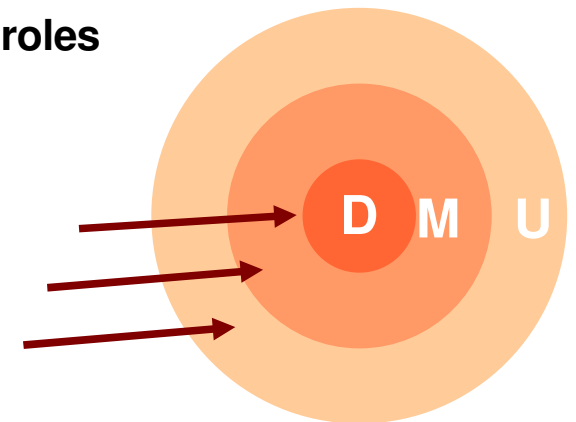
Export

The Capsis project organisation



Partners roles

Developers
Modellers
End-users



Clear participation rules

- **The common part is free (LGPL): green / blue parts**
- **The capsis charter rules (extract)**

Modellers develop themselves their modules

The modules belong to their authors (orange / red parts),

The source codes are shared within the community...

The Capsis community:

Developers + Modellers **co-develop** together

The 2008 Capsis training session

Training politics :

- a general training session once a year (2 days, about 10 persons)
- custom training sessions when needed several times a year

Capsis training session - February 13-14 2008

2 days (the course on the extensions is deferred) :

Annabelle Amm, Isabelle Lecomte (INRA URFM Avignon)

Jérôme Perez, Champak Beravolu Reddy, Jean Dauzat (AMAP)

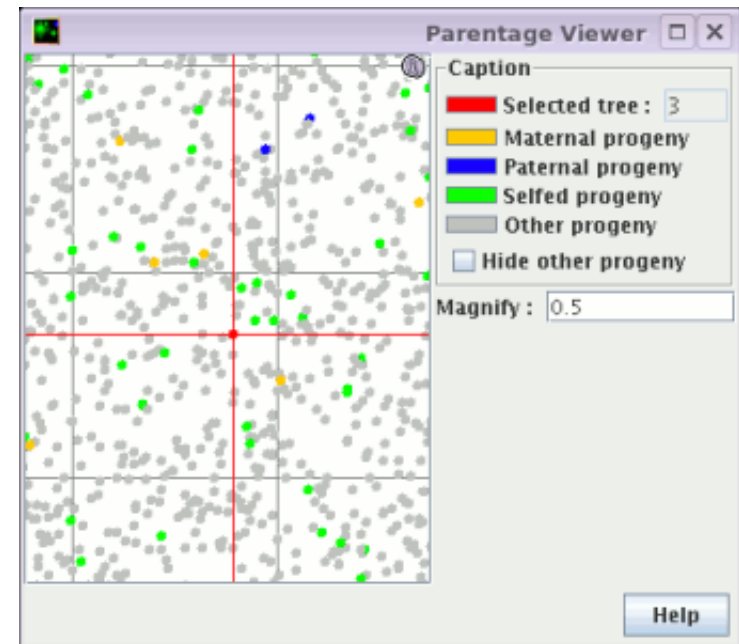
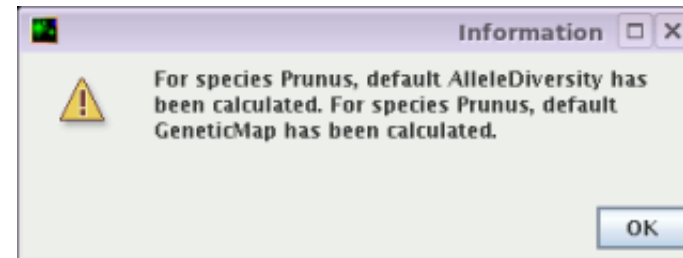
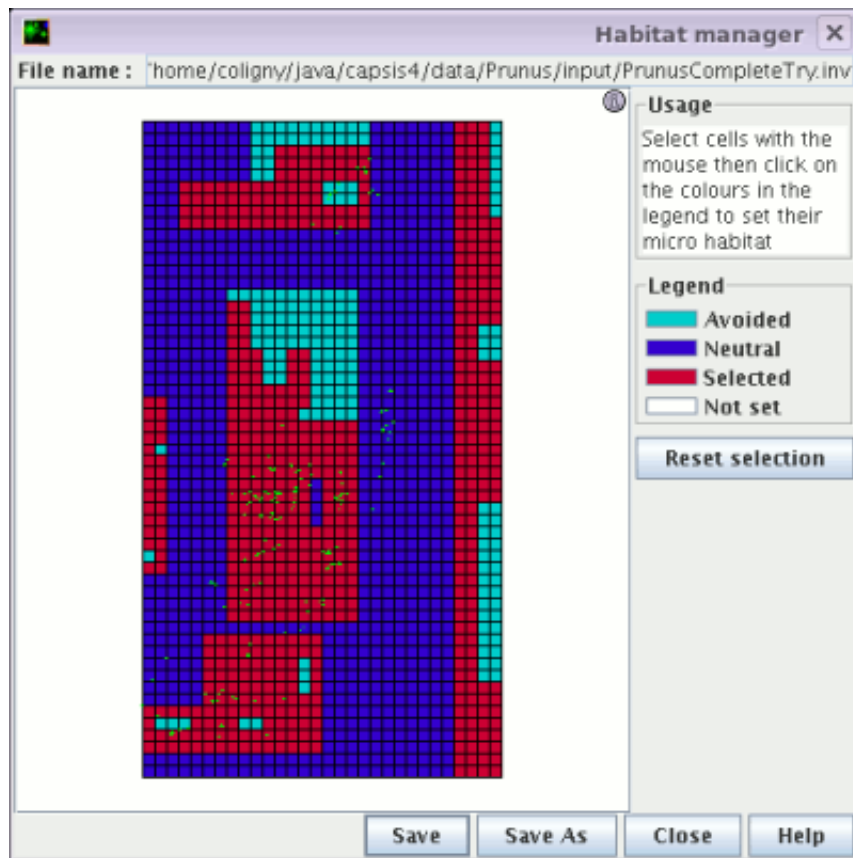
Anne Ganteaume, Eric Maillé (Cemagref Aix en Provence)

Nicolas Robert, Michael Rivoire, Zhun Mao (INRA Lerfob Nancy)

Active projects 2007 - 2008

Prunus

Genetic consequences of seed dispersal assisted by animals in heterogeneous landscapes. Uses the genetics library of Capsis.

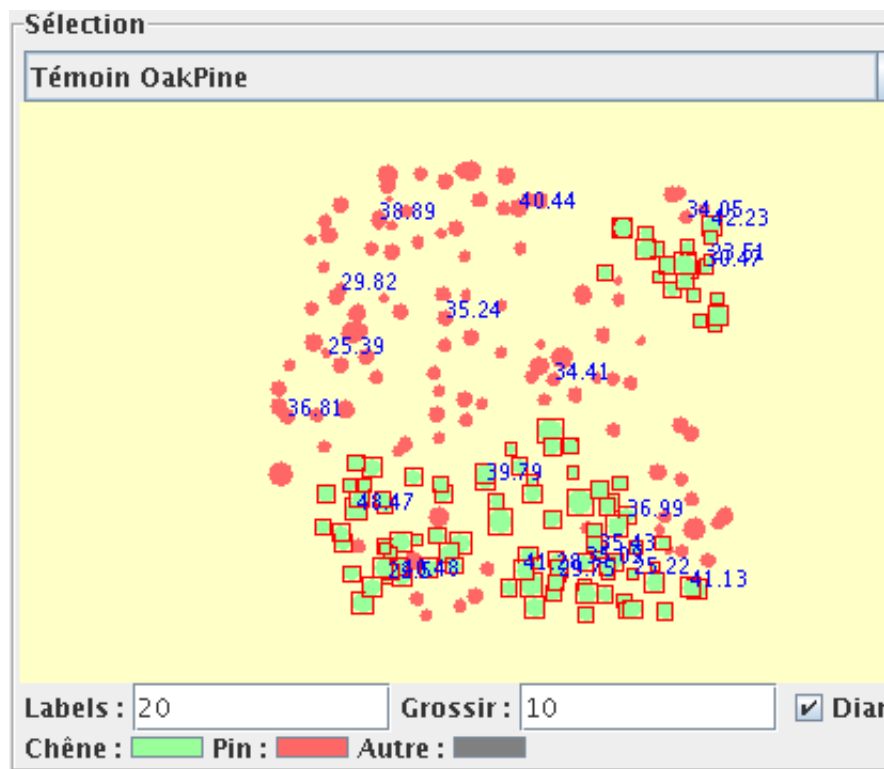


Active projects 2007 - 2008

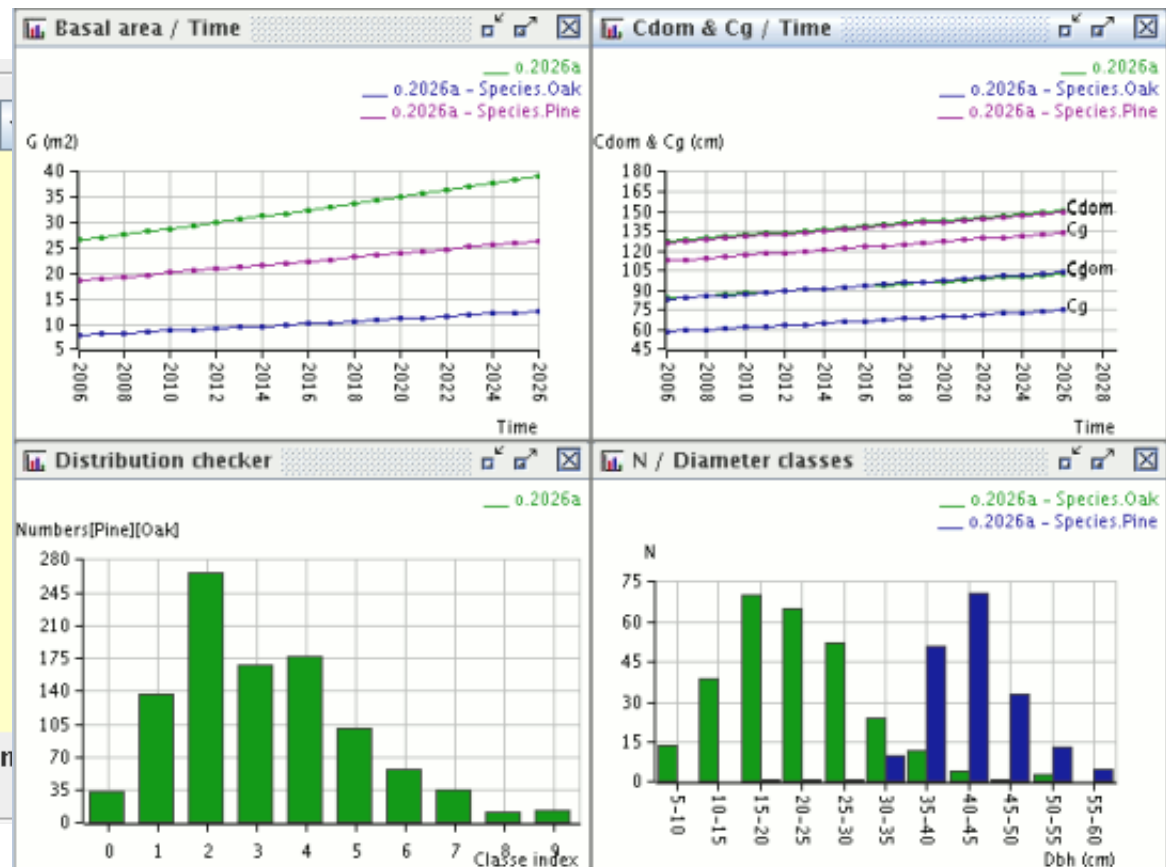
OakPine2

A dynamics model for heterogeneous forests : Oak + Pine

2007: Oakpine 1 - individual based / spatialized



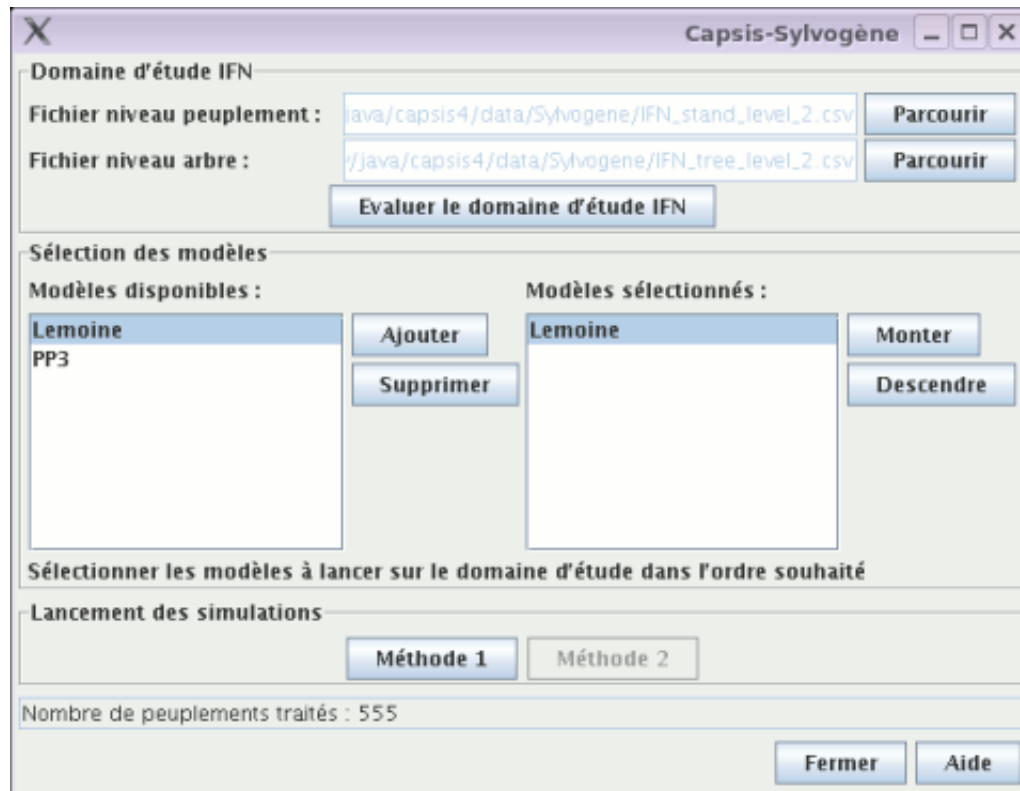
2008: Oakpine 2 - distance-independent tree model



Active projects 2007 - 2008

Sylvogene

- Pole of competitiveness : "Industrie et Pin maritime du Futur"
- The Sylvogene project involves INRA, FCBA (AFOCEL + CTBA), IFN, CRPF, ONF, CAFSA, FORELITE, VILMORIN...
- Action « Build a permanent analysis system for the resource » for the Massif des Landes de Gascogne



- INRA, IFN et FCBA share their data and models

- FCBA decided to integrate its models within Capsis to ease their connection with the IFN data bases.

Active projects 2007 - 2008

Regix

Stand level model for short rotation coppice of poplar and eucalypt.
Economics oriented

Regix X

Culture existante Terrain nu

Culture

Nom : Surface (ha) :

Espèce : populus

Fertilité : Mauvaise

Choix d'un échancier

Culture

populus 1000/ha 10 ans 10 ts 1ere rotation detail
populus 2000/ha 7 ans 10 ts 1ere rotation detail

Echancier de la culture

Année	Opération	Détail	Type	Quantité
0	Nettoyage...	Grobroye...	Mécanisati	1.0
0	Herbicide...	Roundup...	Intrant	3.0
0	Herbicide...	Application	Mécanisati	1.0
0	Fertilisatio...	Engrais 1...	Intrant	222.0
0	Fertilisatio...	Application	Mécanisati	1.0
0	Labour pr...	Labour 35...	Mécanisati	1.0
1	Reprise la...	Disques o...	Mécanisati	1.0
1	Boutures	1000 tige...	Autre	1000.0
1	Plantation...	1000 bou...	Autre	1.0
1	Herbicide...	Gardenet...	Intrant	3.5
1	Applicatio...	Tracteur...	Mécanisati	1.0
1	Entretien...	Herse rot...	Mécanisati	2.0
2	Herbicide...	Gardenet...	Intrant	3.5
2	Applicatio...	Tracteur...	Mécanisati	1.0

Regix X

Culture existante Terrain nu

Parcelle

Nom : Surface (ha) :

Peuplement

Espèce (cloné) : populus

Age de la culture (année) :

Densité initiale (tiges/ha) :

Densité vivante (tiges/ha) :

Fertilité : Mauvaise

Prévision du modèle

Age final :

Densité finale (tiges/ha) :

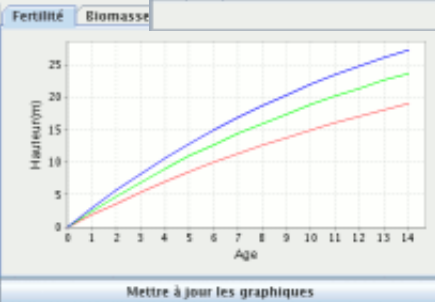
Diamètre moyen (cm) :

Hauteur moyenne (m) :

Biomasse : tv

Choix d'un échancier

Ok Cancel Help



n.2a - Bilan Economique

Inclure les frais fixes et variables

Rot.	An	Opération	Détail	Type	Qua.	Unité/Prix	Gaz.	Total par...	
1	0	Nettoyage parcelle / Broyage végét	Grobroyeur ou disques	Méc.	1 ha	75,00	0	-75,00	
1	0	Herbicide en plein préparation	Roundup (3l/ha)	Intr.	3 l	10,00	0	-30,00	
1	0	Herbicide en plein préparation	Application	Méc.	1 ha	60,00	6	-60,00	
1	0	Fertilisation avant labour	Engrais 100 U P205 (sup)	Intr.	222 kg	0,20	0	-48,84	
1	0	Fertilisation avant labour	Application	Méc.	1 ha	30,00	12,6	-30,00	
1	0	Labour profond	Labour 35-40 cm	Méc.	1 ha	16,00	30,7	-160,00	
1	1	Reprise labour	Disques ou Herse rotative	Méc.	1 ha	10,00	3,75	-100,00	
1	1	Boutures	1000 tiges/ha	Autre	1 0	Sans	0,3	0	-300,00
1	1	Plantation manuelle	1000 boutures / h / jour	Autre	1 ha	15,00	0	-150,00	
1	1	Herbicide de prélevée sur ligne an.	Gardenet paysage 3,5 l/ha	Intr.	3,5 l	85,00	0	-297,50	
1	1	Application année 1	Tracteur + rampe	Méc.	1 ha	60,00	6	-60,00	
1	1	Entretien entre lignes année 1	Herse rotative	Méc.	2 ha	10,00	16,6	-200,00	
1	2	Herbicide de prélevée sur ligne an.	Gardenet paysage 3,5 l/ha	Intr.	3,5 l	85,00	0	-297,50	
1	2	Application année 2	Tracteur + lance	Méc.	1 ha	10,00	6	-100,00	
1	2	Entretien entre lignes année 2	Herse rotative	Méc.	1 ha	10,00	16,6	-100,00	
1	10	Abattage mécanisé	arbre sur pied - perche s.	Méc.	12 tv	5,0	113	-610,39	
1	10	Débardage	perche sur coupe - perch	Méc.	12 tv	16,00	113	-2 017,00	
1	10	Déchetage bord de route	perche bord de route - pl	Méc.	12 tv	10,00	126	-1 260,00	
1	10	Vente plaquettes bord de route			12 tv	37,00	0	4 727,91	
2	11	Entretien entre lignes année 1	Herse rotative	Méc.	2 ha	10,00	16,6	-200,00	
2	45	Abattage mécanisé	arbre sur pied - perche s.	Méc.	37 tv	11,00	413	-2 034,00	
2	45	Débardage	perche sur coupe - perch	Méc.	37 tv	16,00	413	-2 034,00	
2	45	Vente bilon bord de route			37 tv	10,00	0	3 676,10	
2	45	Abattage mécanisé	arbre sur pied - perche s.	Méc.	37 tv	11,00	413	-2 034,00	
2	45	Déchetage sur coupe	perche bord de route - pl	Méc.	37 tv	10,00	126	-1 260,00	
2	45	Vente plaquettes bord de route			37 tv	37,00	0	4 727,91	

n.2a - Synthèse financière

Taux d'actualisation (% [0,100]) : 4.0

Unité des quantités : MWh

Synthèse globale projet : Inclure les frais annuels et variables

Rotation	Scenario A : Plaquettes bord de route	Scenario C : Bilons sur coupe et plaquettes sur coupe
1		
2		

Quantité	Quantité g.	Coût culture	Coût explo	Revenu	TIR (%)	Bao	BASq	Annuité co.
1 123	1 252,407	2 208,84	9 485,22	4 727,91	0,008	-2 459,7...	-2 967,8	-118,71

Synthèse projet : détail par produit :

Produit	Quantité	Quantité gazole	Coût exploitation	Revenu	Solde
bilon bord de r...	695,914	660,156	4 676,10 EUR	0,00 EUR	-4 676,10 EUR
plaquettes bord...	427,491	477,402	4 809,12 EUR	4 727,91 EUR	-81,21 EUR

Synthèse projet : détail par produit et rotation :

Rotation	Produit	Quantité	Quantité gazole	Coût exploitat.	Revenu	Solde
1	plaquettes bo...	318,976	353,017	3 908,40 EUR	4 727,91 EUR	819,50 EUR
2	bilon bord d...	695,914	660,156	4 676,10 EUR	0,00 EUR	-4 676,10 EUR
2	plaquettes bo...	108,515	124,385	900,72 EUR	0,00 EUR	-900,72 EUR

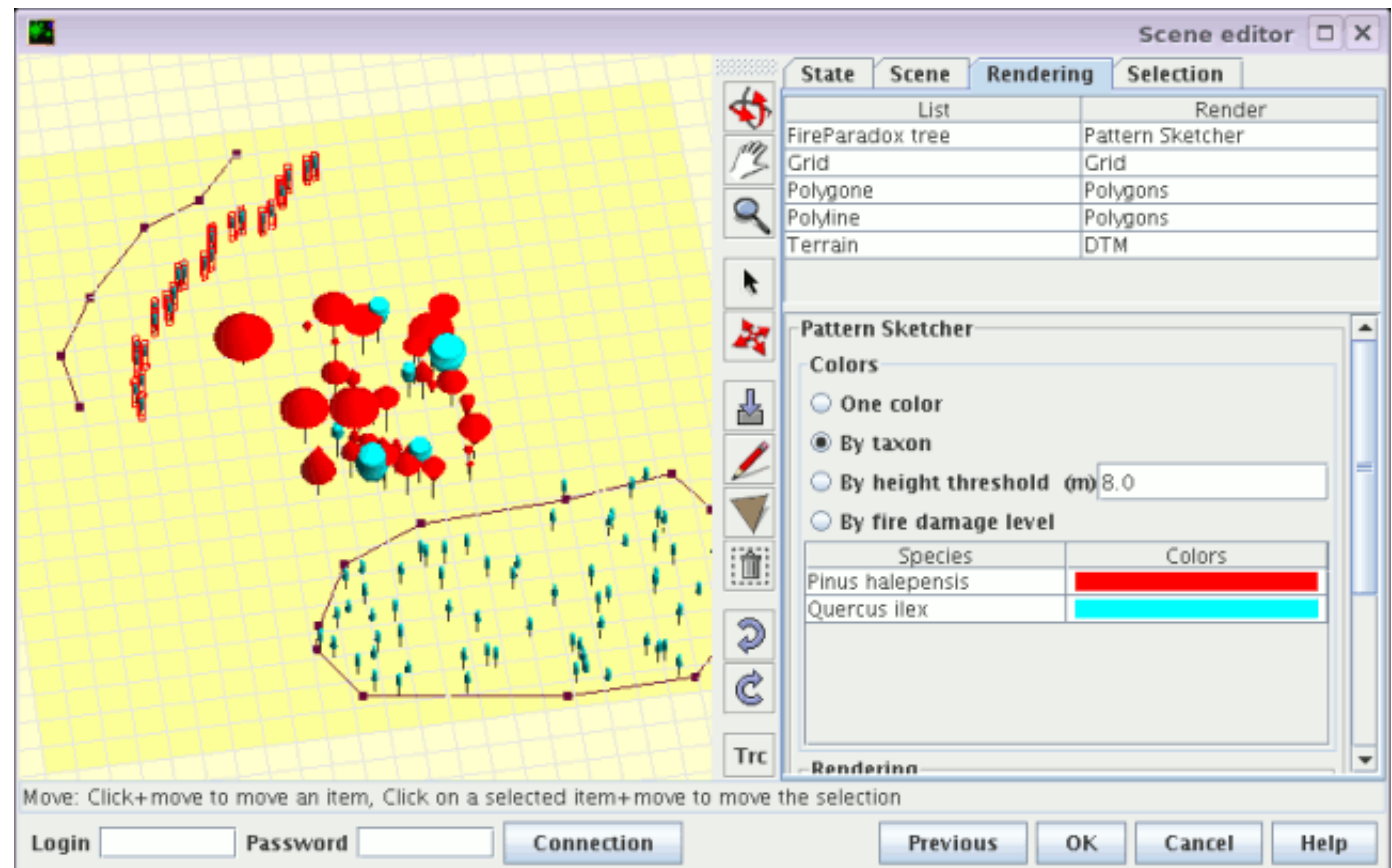
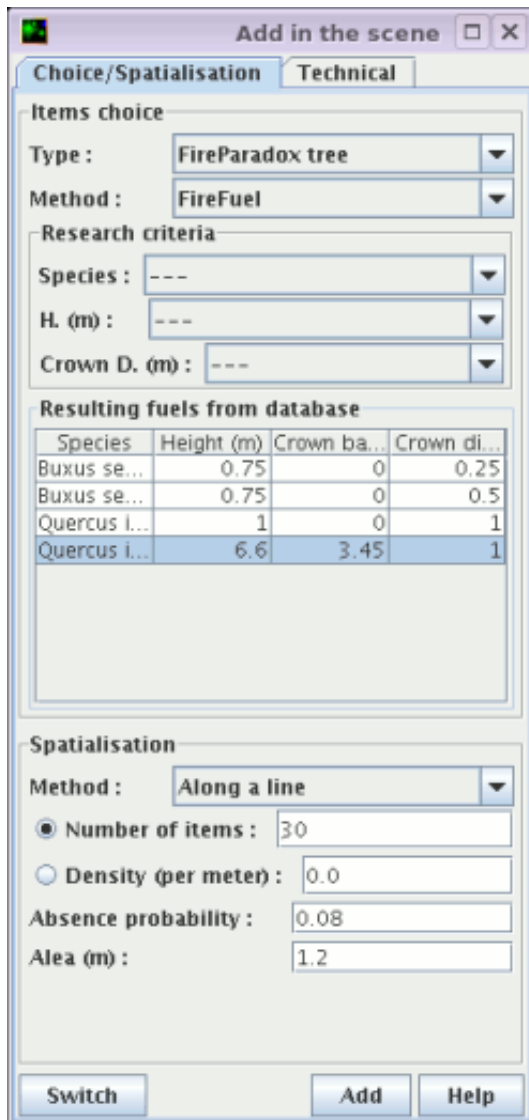
Synthèse projet : détail par processus d'exploitation :

Exploitation	Quantité	Quantité gazole	Coût exploitation
Abattage mécanisé	1 123,405	590,404	4 127,91 EUR
Déchetage sur coupe	108,515	60,048	428,91 EUR
Déchetage bord de ro...	318,976	126,077	1 260,77 EUR
Débardage	1 014,89	361,028	3 667,63 EUR

Active projects 2007 - 2008

FireParadox

- European project : An Innovative Approach of Integrated Wildland Fire Management Regulating the Wildfire Problem by the Wise Use of Fire: Solving the Fire Paradox.
- Needs a software to place in 3D the plants / trees (condidered as fuel) and export a file to a fire calculation program. Will consider the growing again of the trees after fire.

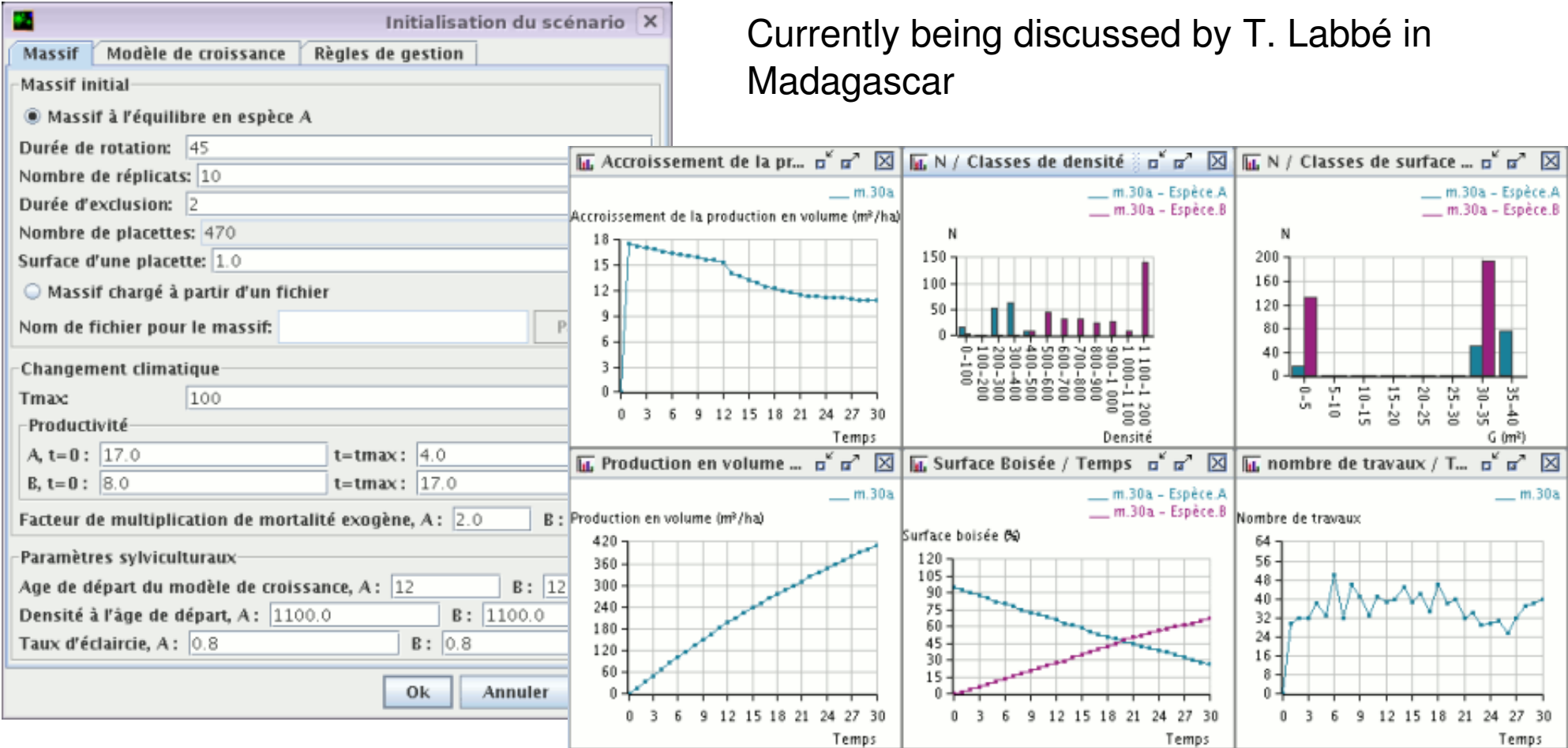


Active projects 2007 - 2008

Mustard

A Forest Growth Model to simulate global change at forest scale (National Research Agency, the Deduction Project).

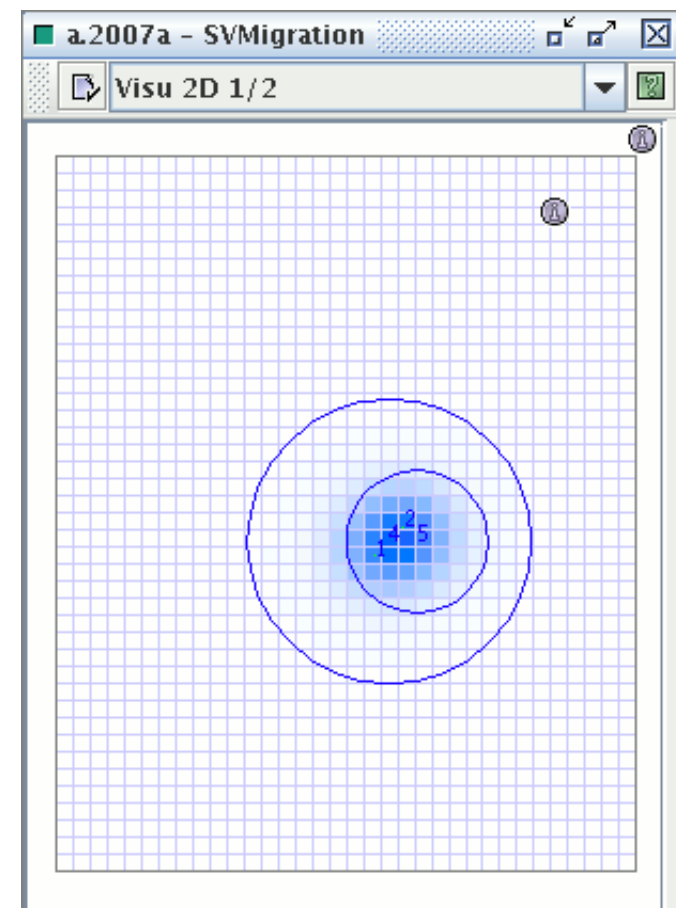
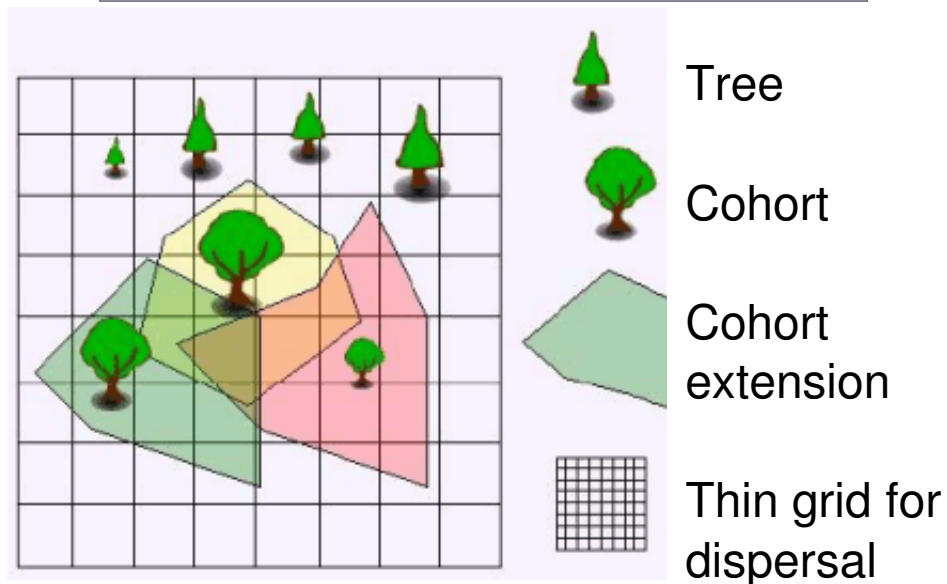
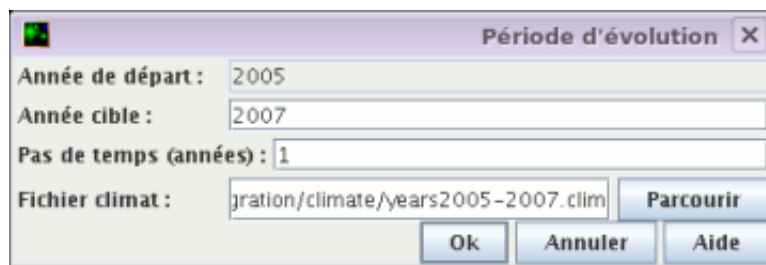
Currently being discussed by T. Labbé in Madagascar



Active projects 2007 - 2008

Migration

A model to estimate potentialities of forest tree migration.
Large scales, local properties (altitude, fertility...), climate files,
individuals and cohorts...



Active projects 2007 - 2008

Dynaclim

An hybrid dynamics model mixing ecophysiology and dendrometry.

The castanea library in Capsis, climate files...

The screenshot displays the Dynaclim software interface, which is used for modeling forest dynamics. It consists of several windows:

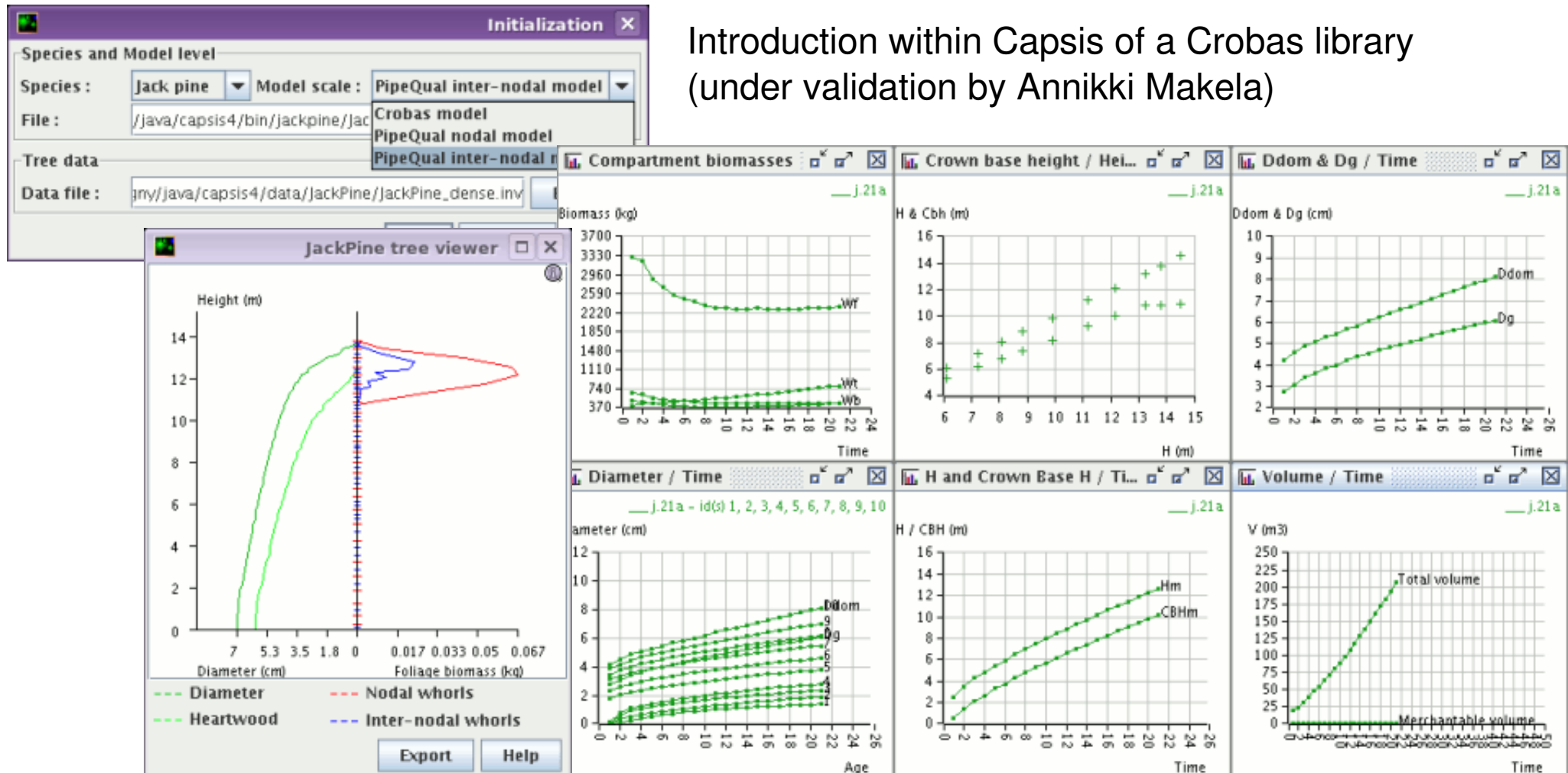
- Initialize scenario:** A window for setting up the model, including input parameters, inventory files, and model parameters like plotting frequency (Yearly, Monthly, Daily, Half hourly).
- Castanea editor:** A central window for editing the Castanea library. It features a table of parameters for six species, with 'Species 1' currently selected. The parameters include growth rates (CRF, CRRG, CRRF, CRBV), mortality rates (tronviv, branviv, rgviv), and various physiological and structural parameters (Lignroots, LIGNrl, LIGNII, LIGNfb, LIGNcb, LIGNcr, ratioBR, RS, TMBV, SF, LMA0, KLMA, alphas).
- Viewer 2D 1/2:** A window for visualizing the forest model. It shows a 3D representation of trees with numerical values (e.g., 18.62, 21.94, 20.75) indicating tree characteristics. Below the 3D view is a 2D map showing the spatial layout of the plot. To the right, there are controls for labels (Visible, Id, Dbh), trunks (Visible, Magnify), and crowns (Visible, Outline, Filled, Flat, Light, Transparent).
- Simple viewer:** A window showing a 2D plot of the forest layout, with a green square highlighting a specific area.
- Histogram:** A bar chart showing the distribution of tree girth (cm) for the year 2006a. The x-axis ranges from 0-5 to 100-105 cm, and the y-axis shows the number of trees, peaking at approximately 60 trees in the 60-65 cm girth class.

Active projects 2007 - 2008

JackPine

Growth of Jack pine in Canada using the Crobas - PipeQual model by Annikki Makela (University of Helsinki, Finland).

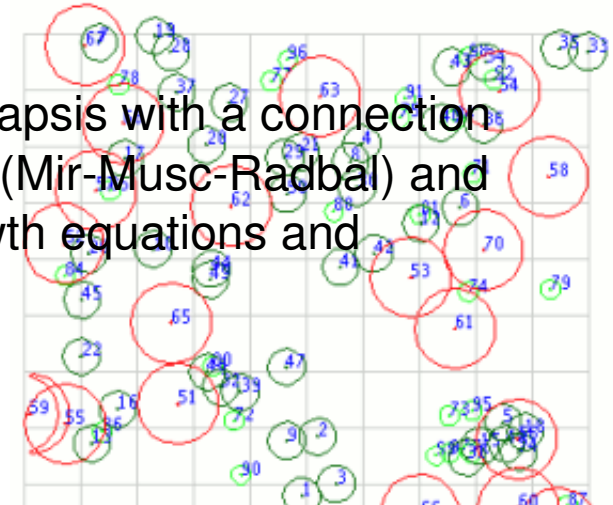
Introduction within Capsis of a Crobas library (under validation by Annikki Makela)



Active projects 2007 - 2008

Stretch

A rewriting of the Sexi-FS model within Capsis with a connection to the AMAP light model by Jean Dauzat (Mir-Musc-Radbal) and other evolutions. Several options for growth equations and radiative balance calculation...



Name of species	Number of Tree
Duku	50
Durian	20
Rubber	30

Main meetings in 2007-2008

CAQ 11 - Montpellier - march 10-11th 2008

Capsis - une plateforme logicielle générique pour la simulation de la croissance des peuplements forestiers

"Plantes et Peuplements Virtuels" meeting - ENS Lyon - march 27-28th 2008

Integration - the software platforms field of enquiry

Capsis publications 2008 (from PMA06)

Hong L.X., Tang S.Z., Li H.K., Li Y.C., de Coligny F., 2008. **Integrated Stand Growth model (ISGM) and its Application**. In: Fourcaud T, Zhang XP, eds. Plant Growth Modeling and Applications. Proceedings of PMA06. Los Alamitos, California: IEEE Computer Society, pp. 223-230

de Coligny F., 2008. **Efficient Building of Forestry Modelling Software with the Capsis Methodology**. In: Fourcaud T, Zhang XP, eds. Plant Growth Modeling and Applications. Proceedings of PMA06. Los Alamitos, California: IEEE Computer Society, pp. 216-222

Transfert actions (2006 - 2008)

22 oct 2007 : **Mathieu Fortin** and **Sylvain Turbis** organised a training session on Capsis and the SamARE model for 13 people outside the Department of Natural Resources and Wildlife on September 12 in Quebec City. The trainees were from **timber companies, consulting firms** and **forest cooperatives** from several regions of Quebec where Maple is present.

20 août 2007 : On June 7th 2007, **Céline Meredieu** and **Thierry Labbé** (INRA Bordeaux) presented Capsis and the PP3 module to foresters. Thirty three participants came from **CASFA, CPFA, CRPF, GFOGARGPF Sud-Landes, Groupama, ONF, SODEF**. This session was jointly **organised by INRA, CRPF Aquitaine and ONF**. The presentation began by the context of the Sylvogène project (Pôle de compétitivité Industrie et Pin du futur) with Sebastien Drouineau (CRPF). Then Céline Meredieu presented Capsis and theoretical and conceptual information about the PP3 project. Dominique Merzeau (CPFA), Sebastien Drouineau (CRPF) and Didier Canteloup (ONF) showed how to use Capsis/PP3 for various applications. (...)

15 jan 2007 : On January 10th, **Mathieu Fortin** and **Sylvain Turbis** (Ministère des Ressources Naturelles et de la Faune (MRNF), Québec, Canada) presented Capsis and the Samare module to **foresters from MRNF region 06 and 07**. Four of the seven participants came from the region 06 (BR06, UG61, UG62, UG64), and the three others were from the region 07 (BR07, UG71, UG72) (BR ? regional office, UG ? management unit). (...)

28 nov 2006 : On October 17th, **Thomas Pérot** and **Sandrine Perret** (Cemagref Nogent sur Vernisson) organized a second session to transfer to the French Forestry Office (ONF) the Laricio and Sylvestris modules. Two of the three participants came from the **ONF DT Centre Ouest**, and the third was from the **ONF DT RD based at Fontainebleau**. (...)

29 juin 2006 : In Orleans, training session by **Patrick Vallet** to the Fagacees model and how to use it in the Capsis platform for the colleagues of the **French Forestry Office (ONF)**. The session was **organized by Sandrine Verger (ONF-DT Centre-Ouest)** and welcomed 12 participants (12.6.2006).

Perspectives

The recruitment of a **new developer** is under progress thanks to INRA-EFPA (arriving next fall).

- Possible to take care better of more integration projects
- Progress on the common parts of the platform
- Better documentation for modellers self-training
- Better training, with multiple short advanced sessions
- Support for other projects (european, ANR, RTRA...)
- More partnerships with european / foreign countries...



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Capsis

UMR Cirad - CNRS - INRA - IRD - Université Montpellier II
botanique et bioinformatique de l'Architecture des Plantes
(AMAP)



JackPine June 2008	Growth of Jack pine in Canada using the Crobas - PipeQual model by Annikki Makela (University of Helsinki, Finland). <i>Contact:</i> Robert Schneider (UQAM, Québec), <i>from:</i> may 2008
Karite	Evolution of the genetic structure and diversity of a population of Karite. <i>Contact:</i> Pierre Dubus (Cirad, Montpellier), <i>from:</i> november 2006
Laricio	A Distance-Independent Tree Model for Corsican Pine. <i>Contact:</i> Sandrine Perret / Céline Meredieu (Cemagref, Nogent sur Vernisson / INRA EPHYSE, Bordeaux), <i>from:</i> march 2002
Lemoine	A Stand Growth Model: a stand level model for Maritime pine in South-West France. Migrated from Capsis2. <i>Contact:</i> Céline Meredieu , Thierry Labbé (INRA, Bordeaux), <i>from:</i> october 2006
Luberon	A Distance-Independent Tree Model for Cedrus atlantica with genetics. <i>Contact:</i> Francois Courbet , Francois Lefevre (INRA URFM, Avignon), <i>from:</i> april 2003
Mangrove	A dynamic model for tropical littoral driven by teledetection. <i>Contact:</i> Christophe Proisy (IRD UMR AMAP, Guyane), <i>from:</i> june 2003
Migration June 2008	Migration of fir at the level of a watershed over a century. <i>Contact:</i> Annabelle Amm (INRA URFM, Avignon), <i>from:</i> april 2008
Mountain	A Distance-Dependent Tree Model concerning mountain species (Spruce). One of the pilot modules in Capsis4. <i>Contact:</i> Benoit Courbaud (Cemagref, Grenoble), <i>from:</i> january 2000 <i>Mountain is under free GPL licence, part of the downloadable Capsis archive.</i>

More details on the Capsis web site:

<http://capsis.free.fr/>

Capsis progress since 20