SIGCA
Gestión Forestal para
Bosques de Madera de Calidad

www.sigcamaderadecalidad.info

Modelización forestal aplicada en la producción de madera de calidad: Un ejemplo con la plataforma SIMANFOR

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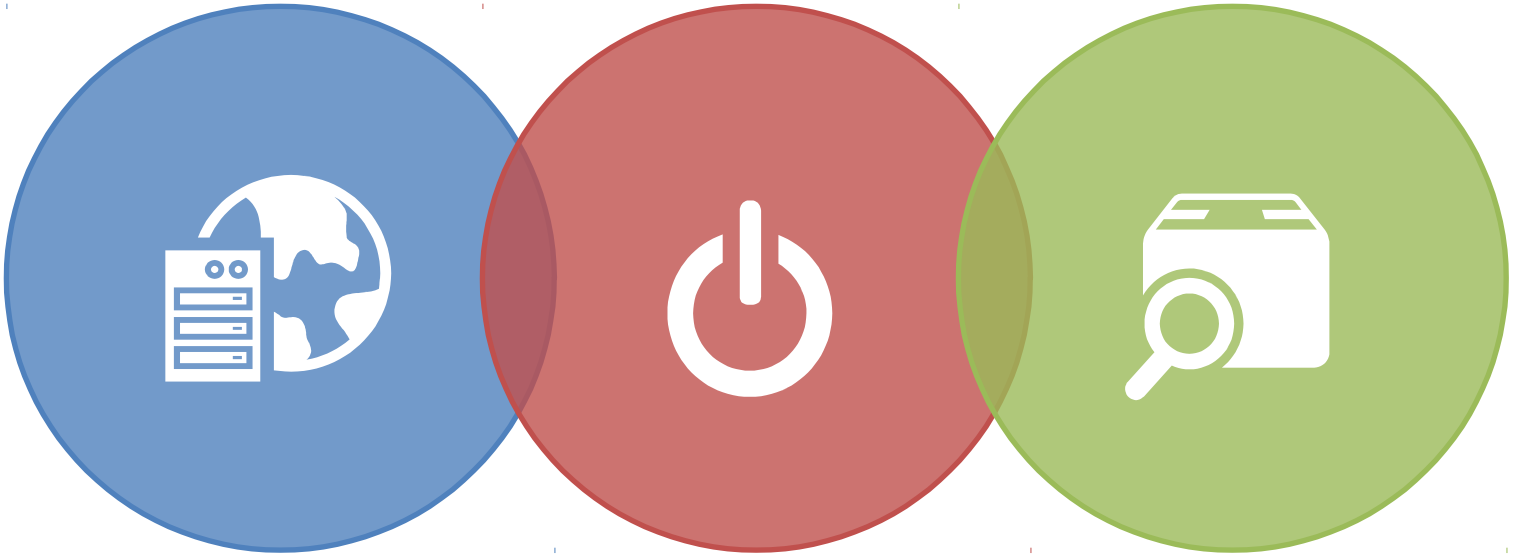
FOREST MANAGEMENT CLOUD SIMULATIONS

SIMANFOR: Sustainable Forest management simulator

02 SIMANFOR



01 Foundations

03 Lessons learned

Forest Management imply a huge variety & amount of data

- Inventory data (sampling plots, LiDAR images, satallite data,..)
- Simulations (growth, yield,…)
- ….

Foundations

These data:

- Can be observational/experimental or simulation and can be original or derived
- Can be recorded in different ways and formats
- Can be private or public (with o without embargo)
- Can be stored locally or remotelly
- Can be stored in different formats (propietary, open,..)
- ….

Its management:

- Can envolve people in different location
- Requiere access in and out office,…

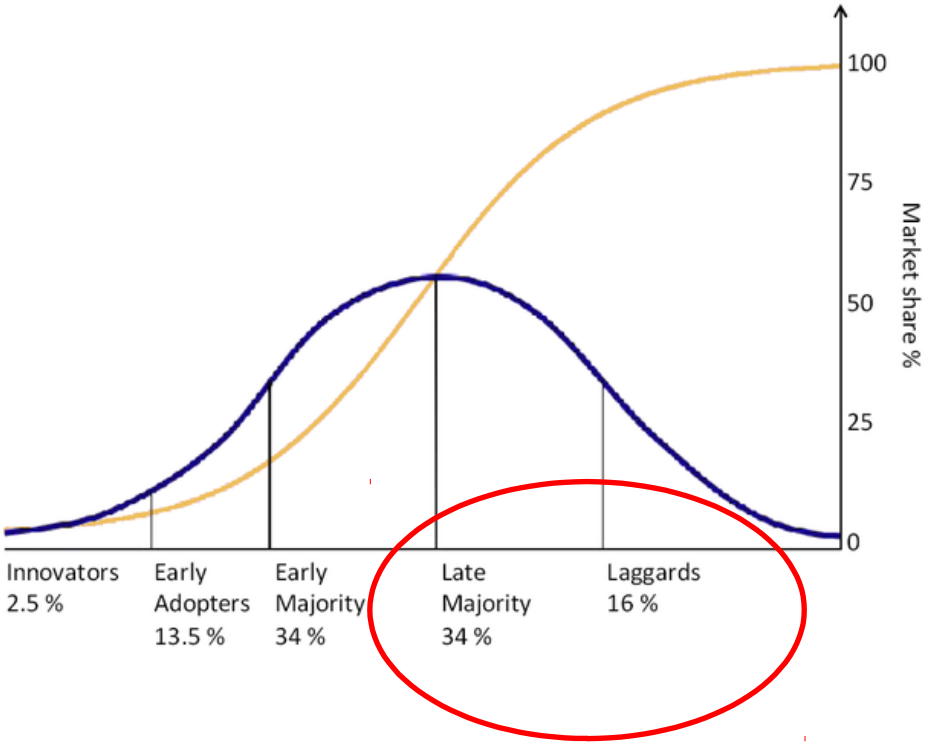
Cloud computing

- Has evolved and now we have a lot different example in our normal life

- Typically includes (all or some):
  - Data gathering
  - Data storage
  - Data management
  - Programming
  - Output generation

Cloud tools & forestry

- As usual, relating with IT tools, foresters are ‘late adopters’



According to Schieman and R. Fiordo (1990)

Cloud tools & forestry

- However different initiatives has been launched in the last decade:

SIMANFOR

GLOBAL FOREST WATCH

INTERPINE
FORESTRY INNOVATION
Cloud Services for Forest and Land Management

FSOS
Forest Simulation Optimization System

openforis

Collect

Collect Mobile

Collect Earth

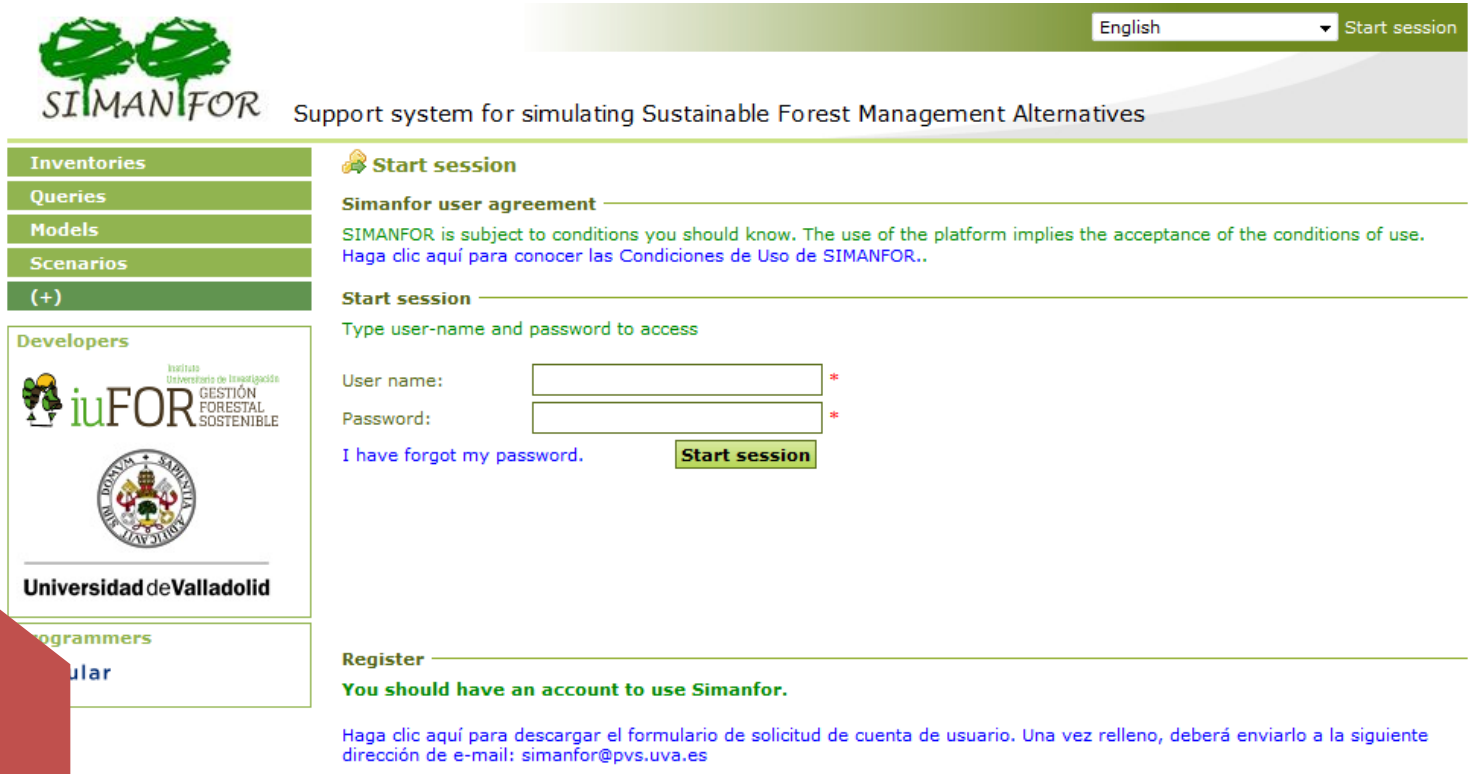
Calc

Geospatial Toolkit

Definition: A flexible web-based support systems for Simulating Forest Management Alternatives

SIMANFOR

02



www.simanfor.es

Uses

- Model development & evaluation
- Forest stands simulation
- Forest management alternatives desing

Purposes

- Training & dissemination
- Forest planning
- Operational forestry

SIMANFOR:

- is a **web based platform**.
- is located in a server in the Forest Sustainable Management Research Institute at Palencia (Spain)
- **its use is free** (only we ask for the free use of the models included in the system)
- **Multilingual**

To use SIMANFOR you need:

- An **Internet connection**
- A **web browser** (Mozilla, Chrome, Safari, Explorer,..)
- An **spreadsheet program** (excel, open-office,..)

and…

a user name and password provided for free by the system administrators.

User's rights by user type

Role	Actions
User	• Generate silvicultural scenarios • Upload new output formats (for personal/own group use) • Upload private/public data
Modeler	• Include/Modified models (programming, document and upload) • Upload new output formats (as default for the models) • All the user's rights
Administrator	• Authorize new users & Supervise proper use • Upgrade models from test to stable stage • All the user and modeler's rights

SIMANFOR Evolution

2009
SIMANFOR Programmed & released
IBERO implemented
Spanish version

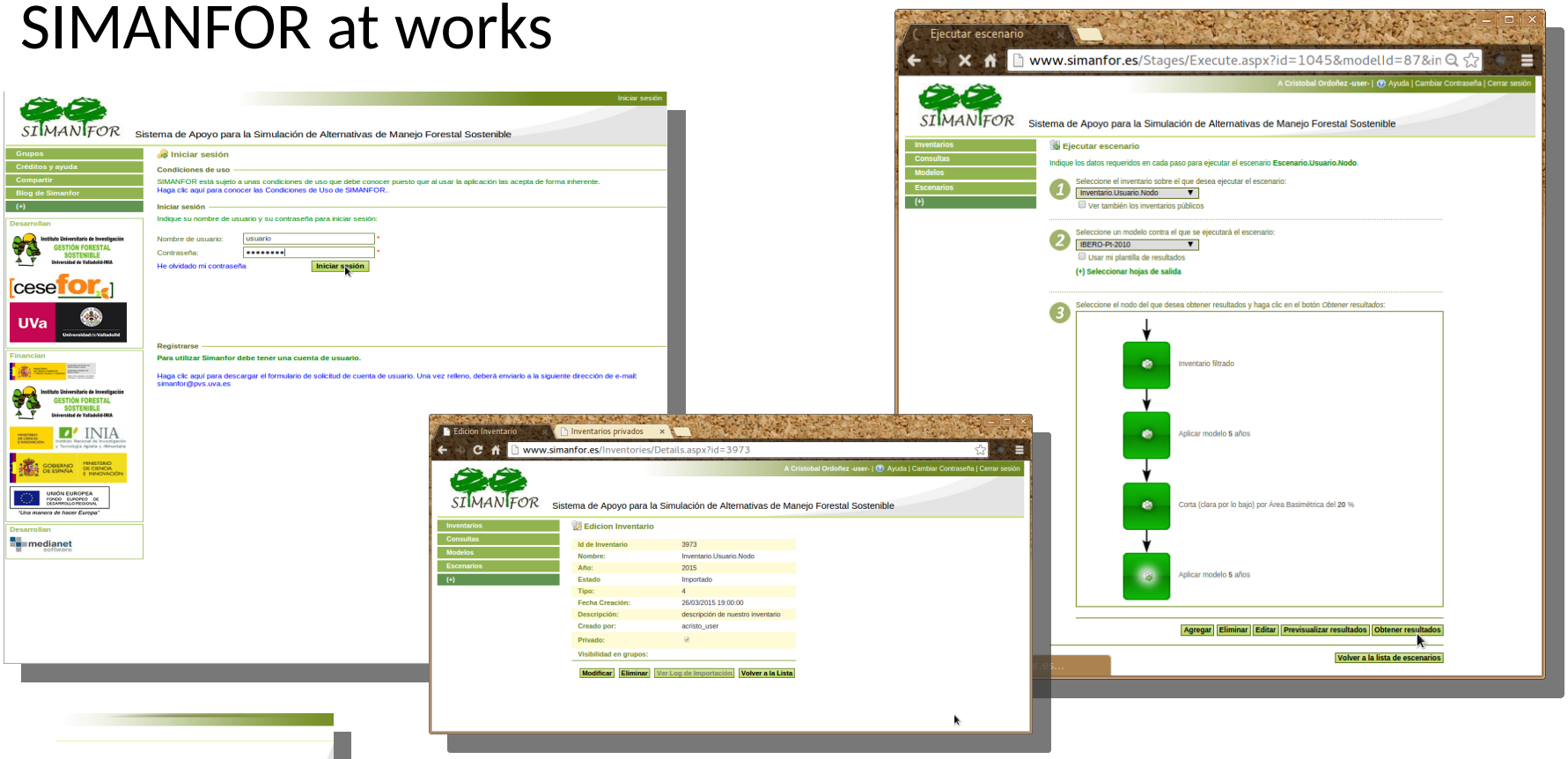
2012
New IBERO parametrizations added, new models included
Small changes on interface
English version

2017
TreeCollect (Android app) released
Inventory management improved
Multi-plot scenarios
New parametrizations and extensions (link functions for biomass, mushroom yield..)
New clearer interface
Portuguese, Vietnamise & French versions

Next
New app (web based) for stand visualization
R package for models implementation
Optimization tool

Forest types already implemented:
Pure *Pinus pinaster*, *P. sylvestris*, *P. nigra*, *P. pinea* & *Quercus pyrenaica* (Spain)
Mixed pine forests (Spain)
Tectona grandis plantations (Mexico)

SIMANFOR at works



SIMANFOR is free but need registration

Data for simulation can be uploaded with spread sheets and collected with smartphone app «tree collect»

Modelers can upload their own models

Simulation of scenarios allows user to predict productivity and choose silvicultural options

SIMANFOR at works

Models are programmed on C# while the platform itself was developed on .NET

Outputs can be modified by VBA routines in MS Excel

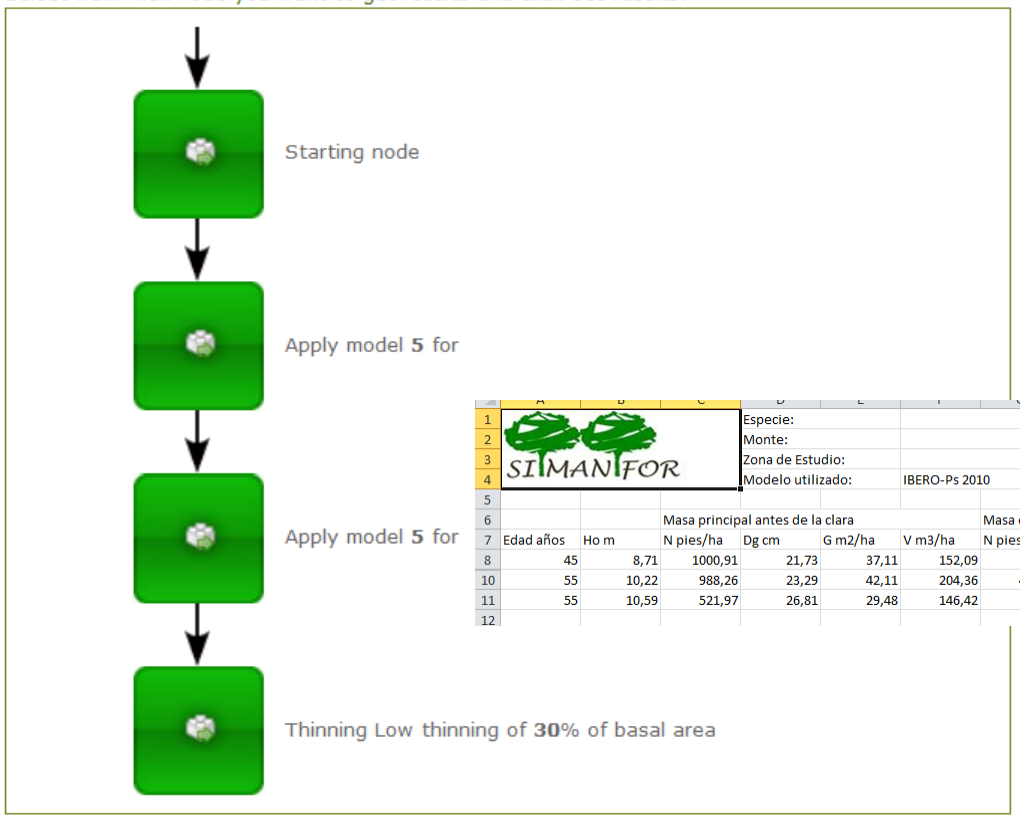

```
using System;
using System.Collections.Generic;
using Simanfor.Core.EngineModels;
namespace EngineTest
{
    /// <summary>
    /// Todas las funciones y procedimientos son opcionales. Si se elimina cualquiera de ellas, se usará un
    /// procedimiento o funcion por defecto que no modifica el estado del inventario.
    /// Modelo IBERO, 2010, Pinus pinaster y Pinus sylvestris
    /// </summary>
    public class Template : ModelBase
    {
        /// declaracion de variables publicas
        public PieMayor currentTree;

        /// Funciones de perfil utilizadas en el cálculo de volumenes según la especie
        public double r2_conCorteza(double HR)
          {
        switch (currentTree.ESPECIE.Value)
          {
          case 21:
        double r=(1 + 0.4959 * Math.Exp(-14.2598 * HR)) *0.8474 * currentTree.DAP.Value / 200 * Math.Pow( (1 - HR), 0.6312 - 0.6361 * (1 - HR));
        return Math.Pow(r,2);
          case 26:
         r=(1+1.1034*Math.Exp(-6.0879*HR))*0.5656*currentTree.DAP.Value/200*Math.Pow((1-HR),(0.6330-1.7228*(1-HR)));
         return Math.Pow(r,2);
          }
        return 0.0F;
          }

```

SIMANFOR at works

3 Select from wich node you want to get results and click *Get results*:



SIMANFOR	Especie:														
	Monte:								Escenario:		Universidad Nacional de La Plata				
	Zona de Estudio:								Inventario:		Jornada_Valladolid				
	Modelo utilizado:	IBERO-Ps 2010							Plantilla de salida:		Sin plantilla				
			Masa principal antes de la clara				Masa extraída			Masa principal después de la clara				Masa muerta	
Edad años	Ho m	N pies/ha	Dg cm	G m2/ha	V m3/ha	N pies/ha	Dg cm	V m3/ha	N pies/ha	Dg cm	G m2/ha	V m3/ha	N pies/ha	Dg cm	
45	8,71	1000,91	21,73	37,11	152,09				1000,91	21,73	37,11	152,09	0	0	
55	10,22	988,26	23,29	42,11	204,36	466,28	18,57	57,94	521,97	26,81	29,48	146,42	6,36	20,68	
55	10,59	521,97	26,81	29,48	146,42								0	0	

Escenario de simulación: pino silvestre / calidad 30 / clara fuerte

		Especie:													
		Monte:							Escenario:		pinaster CE1 castilla y leon				
		Zona de Estudio:							Inventario:		BMPalenIFN3_Ps				
		Modelo utilizado:		IBERO-Ps 2010					Plantilla de salida:		Sin plantilla				
		Masa principal antes de la clara				Masa extraída			Masa principal después de la clara				Masa muerta		
Edad años	Ho m	N pies/ha	Dg cm	G m2/ha	V m3/ha	N pies/ha	Dg cm	V m3/ha	N pies/ha	Dg cm	G m2/ha	V m3/ha	N pies/ha	Dg cm	V m3/ha
42	19	608	22	22	191	194	17	35	414	23	18	156	0	0	0
67	25	398	34	37	446	133	30	108	265	37	28	338	3	32	3
82	28	259	43	37	508	63	48	156	197	41	26	353	2	40	3
102	31	192	50	37	565								1	47	3

Escenario de simulación: pino silvestre / calidad 30 / clara moderada

		Especie:													
		Monte:							Escenario:		pinaster CE1 castilla y leon				
		Zona de Estudio:							Inventario:		BMPalenIFN3_Ps				
		Modelo utilizado:		IBERO-Ps 2010					Plantilla de salida:		Sin plantilla				
		Masa principal antes de la clara				Masa extraída			Masa principal después de la clara				Masa muerta		
Edad años	Ho m	N pies/ha	Dg cm	G m2/ha	V m3/ha	N pies/ha	Dg cm	V m3/ha	N pies/ha	Dg cm	G m2/ha	V m3/ha	N pies/ha	Dg cm	V m3/ha
42	19	608	22	22	191	194	17	35	414	23	18	156	0	0	0
57	22	404	30	29	322	111	26	62	293	32	24	260	3	28	2
72	25	287	39	34	423	76	34	82	211	40	27	341	2	36	2
87	28	207	47	36	497	34	52	101	173	46	29	396	1	45	3
102	30	170	52	37	545								1	50	3

Escenario de simulación: pino silvestre / calidad 20 / clara fuerte

		Especie:													
		Monte:							Escenario:						
		Zona de Estudio:							Inventario:	BMPalenIFN3_Ps					
		Modelo utilizado:	IBERO-Ps 2010						Plantilla de salida:						
		Masa principal antes de la clara				Masa extraída			Masa principal después de la clara				Masa muerta		
Edad años	Ho m	N pies/ha	Dg cm	G m2/ha	V m3/ha	N pies/ha	Dg cm	V m3/ha	N pies/ha	Dg cm	G m2/ha	V m3/ha	N pies/ha	Dg cm	V m3/ha
27	8	1148	14	18	66	335	12	11	813	15	14	54	0	0	0
52	15	785	24	36	262	247	22	64	538	25	27	198	5	22	1
67	17	529	30	38	328	135	33	100	394	29	27	228	3	29	2
87	20	386	36	40	389								2	34	2

Escenario de simulación: pino silvestre / calidad 20 / clara moderada

		Especie:													
		Monte:							Escenario:	pinaster CE1 castilla y leon					
		Zona de Estudio:							Inventario:	BMPalenIFN3_Ps					
		Modelo utilizado:	IBERO-Ps 2010						Plantilla de salida:	Sin plantilla					
		Masa principal antes de la clara				Masa extraída			Masa principal después de la clara				Masa muerta		
Edad años	Ho m	N pies/ha	Dg cm	G m2/ha	V m3/ha	N pies/ha	Dg cm	V m3/ha	N pies/ha	Dg cm	G m2/ha	V m3/ha	N pies/ha	Dg cm	V m3/ha
27	8	1148	14	18	66	335	12	11	813	15	14	54	0	0	0
42	12	796	21	28	167	206	18	32	590	22	22	135	5	19	1
57	16	580	27	34	260	140	25	51	440	28	27	209	3	25	1
72	18	433	33	37	331	74	36	67	358	33	30	263	2	31	1
87	20	353	38	39	380								2	36	2

Lessons learned

04

PROBLEMS (detected)

- Operational foresters mostly ‘allergic’ to cloud computing
- Simulation on SIMANFOR relies simultaneusly on good models, good data and good simulations
- SIMANFOR is too flexible so it’s seems to users as too complicate

SOLUTIONS (potential):

- SIMANFOR (as other simulation systems) should be keeped as simple as possible and user oriented
- Develop ties with foresters community (including develop yield tables to engage them)
- Keep interface clear & simple
- Provide adequate help & support to local problems
- Provide accurate information for public discussion
- Any idea?

Stay tunned

http://www.simanfor.es

@simanfor

https://www.youtube.com/user/ResearchForForestry

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Felipe Bravo, fbravo@pvs.uva.es

SIMANFOR

Felipe's web page

SIMANFOR team:

Cristóbal Ordóñez, Celia Herrero, S|NGULAR (http://sngular.team/) and SIMANFOR community

SIGCA

Gestión Forestal para Bosques de Madera de Calidad

Socios beneficiarios

Socios colaboradores

Esta iniciativa ha obtenido una subvención (por un importe máximo subvencionable de 32.845,78 euros y cofinanciado por el Fondo Europeo Agrícola de Desarrollo Rural: Europa (FEADER), en un 53%, y por MAPAMA, en un 47%, dentro del Programa Nacional de Desarrollo Rural (2014-2020).