AGROFORESTRY MODELLING WORKSHOP – Information Update of 15th May 2019

> **Fully subscribed:** We have reached maximum numbers for this workshop, but you are still welcome to register and have your name put on a waiting list.
>
> If you have already registered but have changed your mind, we'll miss you, but please let me know (Philip.Smethurst@csiro.au) so we can free-up a place for someone else.

Website link to side events: https://agroforestry2019.cirad.fr/programme/side-events

Agroforestry modelling side-event
Friday 24 May, all day - SupAgro Campus, Montpellier

Purpose

This workshop will provide an introduction to plot-scale biophysical modelling of agroforestry systems. Models to be included are Hi-sAFe, WaNuLCas and APSIM, and the program will include some demonstrations. The venue is close to the city centre and the conference centre. A cafeteria is nearby.

Contributors

Marie Gosme (Hi-SAFE model) - works at INRA Montpellier, in the SYSTEM research unit, studying cereal-based agroforestry systems and more specifically the effect of trees on crop growth, development and yield in current and future climates.

Kevin Wolz (Hi-SAFE model)

Meine van Noordwijk (WaNuLCas model) with Stolian Fayolle (CIRAD and SupAgro PhD student) and Eric Justes (CIRAD), Aurélie Métay (SupAgro) and Stéphane Saj (CIRAD) - conducting an evaluation of WaNuLCAS for calculating the water balance of cocoa agroforestry systems in Africa.

Neil Huth with Philip Smethurst (APSIM model; CSIRO, Australia) – developing and applying agroforestry capabilities using the APSIM modelling framework.

Eric Justes (STICS-Intercrop model, included in Hi-sAFe), CIRAD – working with the STICS-Intercrop version for arable and herbaceous crop mixtures.

Christian Dupraz (Hi-sAFe model), INRA

Monika Varga (Programmable Structures Model, Kaposvar University, Hungary)

Date, Time and Venue

Friday 24th May

9 am to 5 pm

Room A in Building 1, Supagro Campus (2 place Pierre Viala, Montpellier, (bus 6, stop "Pierre Viala"), Montpellier (maximum number of participants is 49) – see the following map.

The number of registrations is close to capacity.

Connectivity:

- Internet connection capabilities: guest access to wi-fi
- Data projector and screen provided, but no sound device
- Power sockets provided

Cost

No charge.

Food and drinks can be purchased at a nearby cafeteria

Requirements of Participants

- Participants will provide their own stationary.
- Laptop computers may be used, but are not essential.
- There are no particular preparation, equipment or software requirements.
- We will not be organising a second day for hands-on training (as suggested earlier), but informal follow-up on a one-to-one basis is encouraged.

Draft Program

Apologies - the presenter of the Yield-SAFE model who was included an earlier draft of the program had to withdraw.

0900   Welcome and Coordination (Philip)

0920   Introduction to and Demonstration of Models (3x 50 minutes + 1x 30 minute break)

- Hi-sAFe model (Marie and Kevin)
- WaNuLCas model (Meine and Stolian)
- APSIM model (Philip and Neil)
  - Aims, capabilities, structure and function
  - Examples and demonstrations
  - Strengths and limitations
  - Development status, future developments planned, future developments that could be considered
  - Accessing software and training

1220-1320   Lunch

1320-1615   Case Study Demonstrations (165 min + 20 min break)

WaNuLCas (50 min.)
1. Water balance in coffee agroforestry systems in Africa (Stolian)
2. ….

APSIM (50 min.)
1. Wheat in Australia – crop only (Neil)
2. Eucalyptus in Australia and Brazil - tree crop only (Philip)
3. Faidherbia-maize in Ethiopia with a tree proxy single-tree model (Philip)
4. Glircidia-maize in Kenya with a tree proxy tree-row model (Philip)
5. Eucalyptus-wheat in Australia with an active tree-row model (Neil)

Hi-sAFe (50 min.)
1. A cereal-only simulation using STICS (Marie, Kevin)
2. Cereal-based agroforestry systems (Marie)
3. . . . .

Agro-environmental modeling by Programmable Structures, Hungary (Monika, 15 min.)

1615   General Discussion

1700   Close

Model Access Instructions

If participants want hands-on experience, we recommend downloading the software and if possible ensuring that it runs. The following instructions will assist with accessing the models.

Hi-sAFe

- Go to https://www1.montpellier.inra.fr/wp-inra/hi-safe/en/demande-login/ to request a login
- You will be given access the installation guide of the model on the website, and a link to download the executable will be sent to you by email

- There is an R helper package to build, run and analyse simulations, to install it and look at the vignette explaining how to use it, type in R:

  install.packages("devtools")
  devtools::install_github("kevinwolz/hisafer")
  library(hisafer)
  vignette("hisafer-vignette")

- This package comes with built-in simulations so that you don't have to install the model and run it to have a feel of the model and see if it can be useful to you.
- Informative paper:
  - Dupraz, C., Wolz, K. J., Lecomte, I., Talbot, G., Vincent, G., Mulia, R., ... & Lawson, G. (2019). Hi-sAFe: a 3D agroforestry model for integrating dynamic tree–crop interactions. *Sustainability*, *11*(8), 2293. https://doi.org/10.3390/su11082293

APSIM

- Go to APSIM website at http://www.apsim.info/APSIM.Registration.Portal/Main.aspx
- Select the Next Generation version that suits your platform, i.e. Windows, Apple or Linux.
- Complete other details and agree to licence conditions.
- An email will be sent to you with a link for the download.
- Install after downloading.
- Start by opening an example or training simulation, then saving it to your nominated folder and simulation (file) name, which must be of the format *.apsimx.
- Open the nodes of the simulation until you find 'Weather'. Click on it and note the address and name of the weather file used, e.g. C:\Program Files\APSIM2019.2.21.3537\Examples\WeatherFiles. Click on 'Browse' and navigate to that address and met file until it is loaded. You should see a graphs of average monthly rainfall, and options to view other aspects of the data in that file.
- Alternatively, outside APSIM, you can find the weather file (*.met) at the download location, and copy it to any other file location to which you can point APSIMx to find it.
- Run this simulation by right-clicking on the top node of the simulation tree and choosing 'Run APSIM' or pressing F5.
- If successful, a green simulation-in-progress bar will briefly appear at the bottom of the screen, and, when complete, the time taken reported.
- Note that the agroforestry model is not yet in the release version. A prototype will be provided during the workshop for use with the downloaded version of APSIM Next Generation.
- Informative papers:
  - Holzworth, D., Huth, N. I., Fainges, J., Brown, H., Zurcher, E., Cichota, R., ... & Snow, V. (2018). APSIM Next Generation: overcoming challenges in modernising a farming systems model. *Environmental Modelling & Software*, *103*, 43-51. https://doi.org/10.1016/j.envsoft.2018.02.002
  - Brown, H., Huth, N., & Holzworth, D. (2018). Crop model improvement in APSIM: using wheat as a case study. *European Journal of Agronomy*, *100*, 141-150. https://doi.org/10.1016/j.eja.2018.02.002

STICS

- Go to STICS website at https://www6.paca.inra.fr/stics_eng/
- New version 9.0 available from October 2018.
- Complete details and agree to licence conditions in order to download the STICS model files.