How to Do with the Miribel dataset

A1) Matlab

A2.1. Download the Matlab runtime (select the Windows R2018b (9.5) 64-bits installer): https://fr.mathworks.com/products/compiler/matlab-runtime.html

A2.2. Launch MCR_R2018b_win64_installer.exe

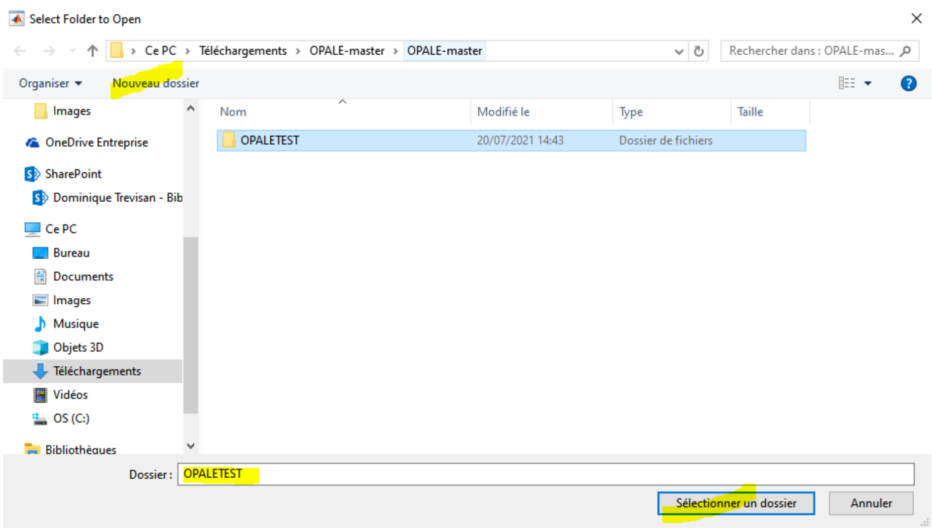
A2) OPALE

A2.1. Download OPALE executables and test files from : https://github.com/TipTop-PSDR/OPALE

Click Code ; Click Download ZIP

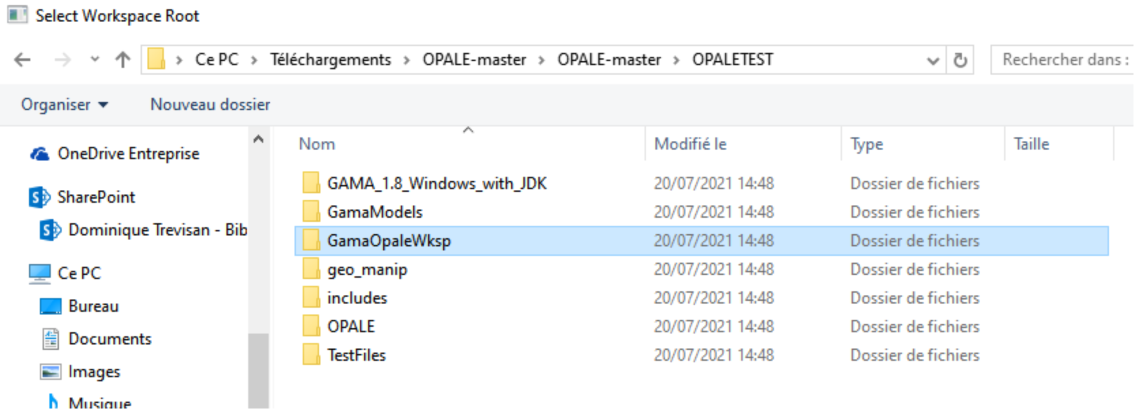
A2.2. Unzip OPALE-master.zip. Run Install.exe. If necessary hold up the windows protection

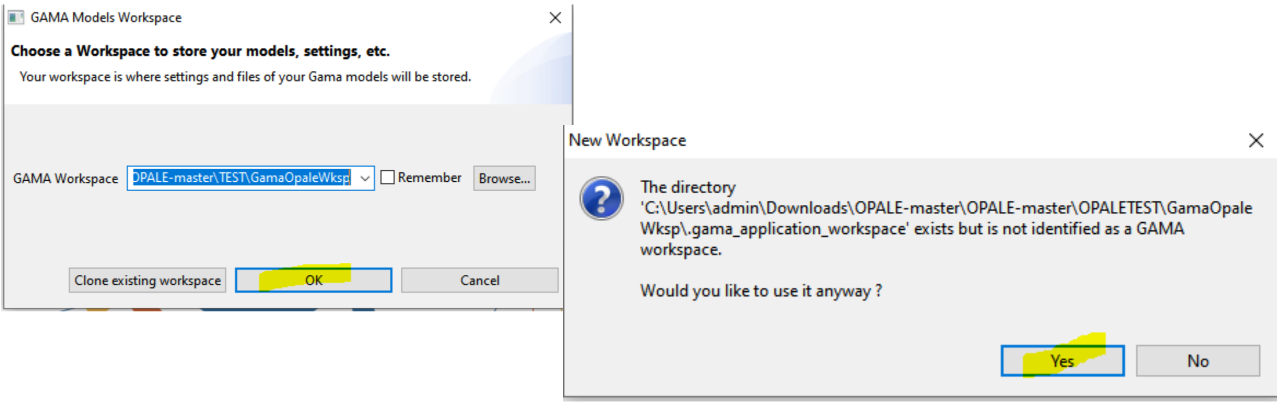
A2.3. OPALE Setup needs a custom folder for installing and testing OPALE



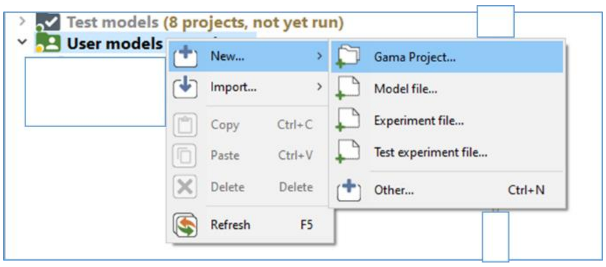
A2.4 Name it …/OPALETEST (for example)

A2.5 At step OPALE Setup 5/6, Gama is launched. Gama requires a Workspace Root. Browse and select the .../OPALETEST/GamaOpaleWksp folder.

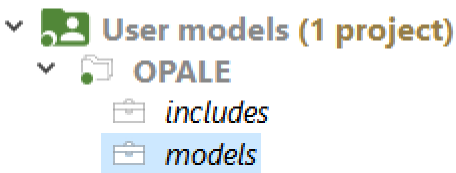




A2.6 Under Gama, Right click on User models, New, Gama Project. Create a project named OPALE (all capital letters required, strictly observe the spelling). Uncheck Create a model file, Finish.

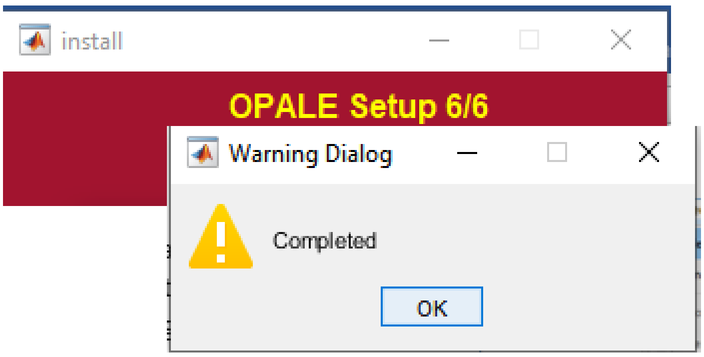


A2.7 Wait untill the OPALE project is created under User Models



A1.6. Close Gama

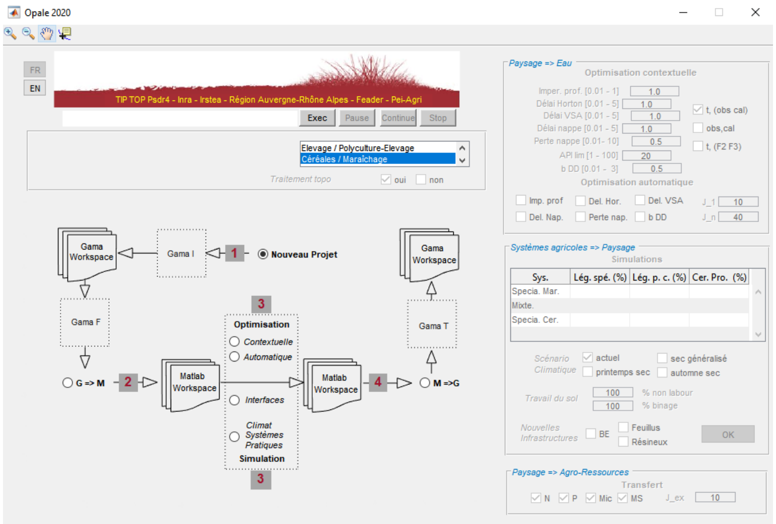
A1.7. Ok on Message box.



B) Run OPALE

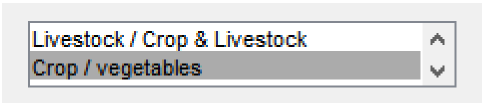
B1) LULCC Programs

B1.1. launch .../OPALETEST/OPALE.exe



B1.2. Select the push button « EN »

B1.3. Select Crop/Vegetables in the list box

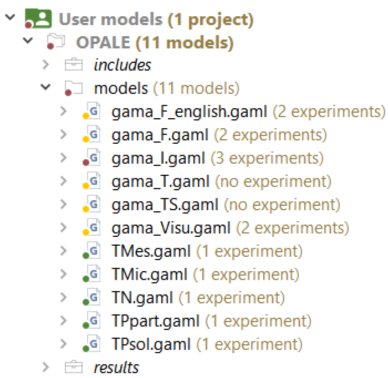


B1.4. Select the « New Project » button of the central workflow

B1.5. Click the Exec button

B1.6. Select the input data file .../OPALETEST/MyInputFile.txt.txt

B1.7. Accept messages and Wait for the automatic launch of the Gama Platform. After the the first launch, wait a while until the copying of Opale User models is finished



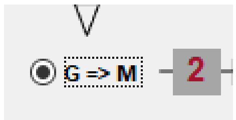
B1.8. Execute the Gama_I_Crops program

B1.9. Close the experiment. Select the the Gama_F_english tab and launch the Gama_F_Crop_Vegetables experiment

B1.10. Wait during the instantiating of agents. Run the experiment when ready

B1.11. Exit the gama Platform after completion. (When the message “Recording achieved” is printed)

B1.12. Select the G=>M button in the central workflow of OPALE gui to transfer data to the matlab environment



B1.13. Click the Exec button

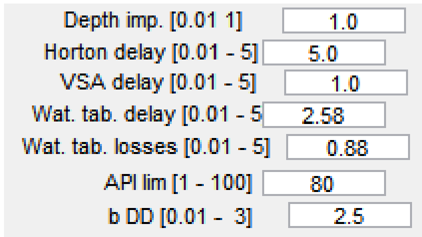
B1.14. Save results in …OPALETEST/workspace/MyFile

B2) WMWL Programs

<u>B2.1. Contextual optimization</u>.

B2.1.1.Select the Contextual button

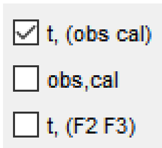
B2.1.2. Enter parameter values k_m (depth imp.), c_1 (Horton delay), c_2 (VSA delay), c_3 (Wat tab losses), λ (Wat tab delay), b (b DD) and API max (API lim).



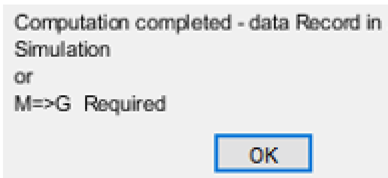
B2.1.3. Click Exec, select …/OPALETEST/workspace/MyFile.mat

B2.1.4. Click the Pause/Continue button to zoom in/out and examine the plot data with top tools

B2.1.5. Check obs,cal or t(F2,F3) to change plots



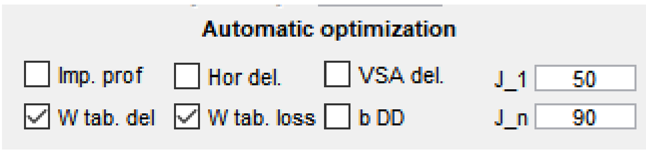
B2.1.6. Run Computations until completion. Click OK



<u>B2.2. Automatic optimization.</u>

B2.2.1. Select the Automatic button

B2.2.2 Choose the set of optimized parametres and define the calibration period (Julian date J_1=50, J_n=90)



B2.2.3 Click the Exec button, select the …/workspace/MyFile.mat file.

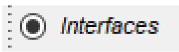
B2.2.4 wait until the lowering of f(x) is less than the tolerance limit. Click OK to close the pop up menu.

```
     4           15           0.26781       0.0080422       0.00092223
     5           18            0.2678       0.0024147       0.00031071
     6           21            0.2678      0.00075839      9.9724e-05
Optimization stopped because the relative sum of squares (r) is changing
         by less than options.FunctionTolerance = 1.000000e-06.
```

B2.2.5 Open the …/OPALETEST/workspace/Temp/YYYYDDMMHHmm_optimX.csv file where optimized parameters values are saved

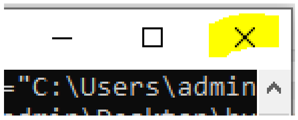
B2.3. Changes landscape Interfaces.

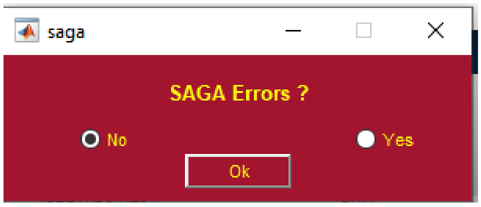
B2.3.1. Select the Interfaces button. Select the FS check box. Click the Exec button. Select the …/workspace/Myfile.mat file



B2.3.2. Select the new FS file …/OPALETEST/TestFiles/bois/nouvelles_bandes_enherbees/bandes_enherbees40.shp.

B2.3.3. Verify there is no error messages with SAGA libraries runs in the command windows. Close the command window to pursue the OPALE treatment. Ok on No Errors message box.

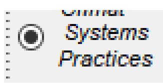




B2.3.4. Note the address of the matfile results …/OPALETEST/workspace/New_Infra_GRASS_MyFile.mat

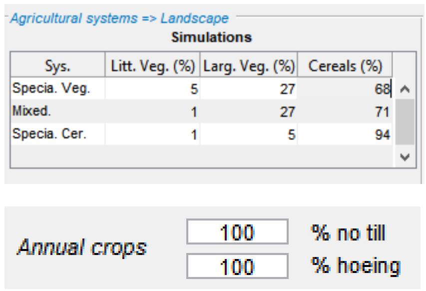
B2.4. Changes farming systems or Cultural practices.

B2.4.1. Select the Systems button and click the Exec Button

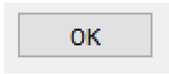


B2.4.2. Select the original project …/OPALETEST/workspace/Myfile.mat file or the project modified in B2.3

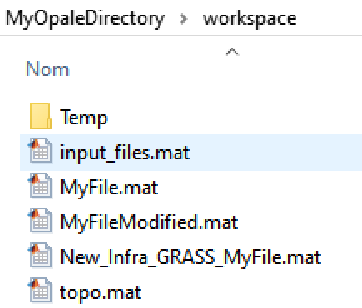
B2.4.3. Modify the % of agricultural systems or the % of no till or the % hoeing or the two/three of them.



B2.4.4. Click the OK button to pursue the OPALE treatments



B2.4.5. Give a new name to the project : MyFileModified.mat. This latter is saved in …/OPALETEST/workspace and can be treated as before in B2.1, B2.2, B2.3.



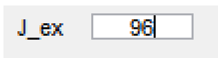
B3) SSMT Programs Surface and Subsurface transfer functions (SSTFs)

B3.1 Transfer functions for suspensions

B3.1.1 Verify parameter values (§ B2.1.1 & B2.1.2)

B3.1.2. Select the M=>G button. Click The Exec Button

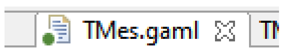
B3.1.3. Enter the date of the beginning of the transfer period to be studied



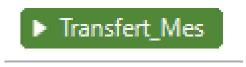
B3.1.4. Click the Exec button. Choose the …/workspace/MyFile.mat file

B3.1.5. Accept the opening of the Gama platform

B3.1.6. Load the Tmes.gaml model (SM transfer) (for suspended matter)



B3.1.7. Run the TMes.gaml model



B3.1.8. Alternatively run the TMic.gaml model (for suspended microorganisms)

B3.1.9. Open the …/MyGamaWorkspace/OPALE/results/Suspended Matter.csv file in an excel sheet (With MS Office2016: Navigate to the “Data” tab. Click on the “From Text” button, Click “Import.”)

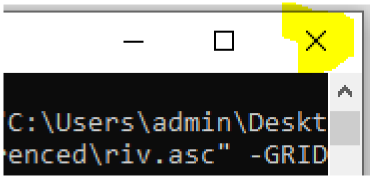
Note the eta value, the tau days, the number of particles reaching the outlet and the SSTF function

eta	0.04495606	
day	nb part	FT
1	401.7182989	0.78144281
2	112.3542525	0.21855719
3	0	0
4	0	0
5	0	0

B3.1.10 Enter the date of the beginning of a new transfer period to be studied

B3.1.11. Repeat §B3.1.4 (if needed §B3.1.5, §B3.1.6.)

B3.1.12 Verify there is no error messages with SAGA libraries run in the command windows. Close the command window to pursue the GAMA treatment.



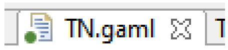
B3.1.13. Run the TMes.gaml (idem §B3.1.7)

B3.2 Transfer functions for solutes

B3.2.1 Repeat steps §B3.1.1, §B3.1.2, §B3.1.3, §B3.14 (and §B3.1.5 if the Gama platform is closed)

B3.2.2. Select the M=>G button. Click the Exec button.

B3.2.3 Load the TN.gaml model (solute transfer for Nitrogen)

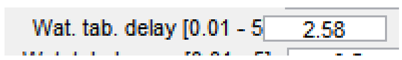


B3.2.4 Run the TN.gaml model

B3.2.5 Alternatively Run the TPsol model transfer)

B4) Groundwater Transfer functions (GTFs)

B4.1. Note the power-law parameter for deep water transfer



C) SSMT Validation

C1. Open the .../OPALETEST/convolution_stock_miribel.xlxs file

	η	0.029				*d*	0.00004		τ	1	2	3	4	5
	k	7835		obs(ntu)	ntu mg/L	*u*	0.135161	3.9528179	FTESS(τ)	0.78144281	0.21855719	0	0	0
SURF ($m^3.s^{-1}$)	S(t)	M(t)	ηS(t)M(t)		2.04104589	flowntu	cal(ntu Tonnes/jour)							
0.0067457	0.1973	0.02107072	0.9445902	1	5.03202185	0.159498507	0.099768	0.00356768		0.74	0.21	0.00	0.00	0.00

C2. Copy the SSTF values from the imported Suspended Matter.csv file (§3.1.9)

C3. Transpose and Paste the copied values in cells M2..AA2

C4. Copy the eta value from the imported Suspended Matter.csv file in cell E1

C4. Use the solver to optimize the unit conversion factor u