Model logs

Note down the time and modification made to the model each time

2015-5-25 starts to transform the basic Grape model into a complex one. First convert the daily calculation into hourly calculation; second add the complex light model. Control whether there is light or not by the sunrise time and sunset time. We use math.round sunrise and sunset to get a integer number. The error in this rounding method is minimized by the calculation of light power within each hour. The calculation of light power does not follow the exactly hour. Instead, we use the sunset time minus the sunrise time to get the number of points that we want to calculate. These number is equally distributed over the real day length with decimal numbers.

Save the model or initialize the model before closing. Else you would get problems in opening, big memory.

2015-5-26 exploring the light model:

Some problems I met:

1. I tried to use setVisulize for the spectral light, However it doesn’t work. It works for other light sources like directional light.
2. With the old light model, the AlgorithmSwitchShader works well. However, for the new light model there are some issues. See the code and image.
3. For the directional light we use setPowerDensity() to give the power. And for others like spectral light and spot light we use setPower(). What is the difference between them? I tried the directional light and spot light in the code. I find to reach the same illumination, directional light need much lower power compare to spot light. For directional light I only need powerDensity 1 to reach the same illumination by spot light with power 100.
4. The meaning of the parameters for spectral light (correct me if I am wrong): a. physical distribution defines the direction of the rays. In the double array, the number of rows represents the rings or plane that you defined. The horizontal angle can be calculated using 180/the number of rows. One row of array represent the points in one ring. The vertical angle can be calculated using 360/number of points in one row. However I do not understand the meaning of those values in the DISTRIBUTION array. In the daylight example they were 1, and in the Lamp test environment there were more than 3000. b. Spectral curve defines the wavelengths and amplitudes of the light source. Amplitudes are expressed in relative terms. When we use BlackbodySpectralCurve, then it uses a function of temperature to calculate the wavelengths and amplitudes. C. power I feel in the new light model, it is better to express the power in W m-2. It is commonly measured and is an instant value. The power is the
5. When we use the directional light, spot light and other light sources, we can not specify the Spectral curve, but we can measure the absorption of different wavelength as shown in the daylight example. However, I was wondering what are the default spectral curves for those light sources. Uniform distribution for all wavelengths or not?
6. I see in the measure mode, GPU\_LM. setMeasureMode (MeasureMode. FULL\_SPECTRUM); we have options to choose full spectrum, integrate, and RGB. This is very nice. So if we only care about total radiation and PAR, we can just use integrate. Given the details and complexity of the spectral curve, I think for light interception and photosynthesis, I can just use directional light. Maybe for red:far red ratio we can use the full spectrum. However, when I use INTEGREATED\_SPECTRUM in the full spectrum example, I got an error for unexpected exception even I suppressed the output.
7. I was wondering can I use the spectral light in the diffuse sky light settings using an array of 72 directional lights positioned regularly in a hemisphere in six circles. Do we need some adaptations for this application. It seems not. See my code of the directlight and diffuse light. With new light model and directional light, it works (fraction of intercepted light close to 1). However for spectral light, it provides a very high value for the fraction of light intercepted by the tiles.
8. How to use the object Patch. Right now I use lots of tiles to build the soil. maybe with patch, one sentence can do the all.
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10. What are the difference between setSpecular, and setDiffuse?
11. What does grayStone used for?
12. How to search the properties of a module in the console?
13. FluxLightModel lm = new FluxLightModel(RAYS\*1000000, 10);

lm.setSeed(SEEDS[j]); lm.compute();

1. [getSensedIrradiance](http://wwwuser.gwdg.de/%7Egroimp/api/de/grogra/rgg/FluxLightModel.html#getSensedIrradiance%28%29)() is for sensornode, while [getAbsorbedPowerMeasurement](http://wwwuser.gwdg.de/%7Egroimp/api/de/grogra/rgg/FluxLightModel.html#getAbsorbedPowerMeasurement%28de.grogra.graph.impl.Node%29)() is for object. Double
2. Measurement getAbsorbedPowerMeasurement(Node node)
3. Spectrum getAbsorbedPower(Node node)

2015-6-2 never name the variable as the same within the GroIMP, like name relative humidity as RH can cause lots of problems since RH is used in the GroIMP for rotating.

2015-6-2 to 4 separate the global parameters and plant parameters, change the chart and table outputs.

2015-6-5 change the model updating structure, hiding update in the module

2015-6-18 add water potential module

2015-6-23 improved the visulization of berry bunch

2015-6-25 switch the model into a static model and read model paramters from different files

2015-6-29 add berry growth module

2015-7-5 add the NEMA model

2015-7-8 reflection on the model, current status and problems

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2015-11-20 for optimization I removed the random process in the initiation modular and leaf modular. Add this back later…………….

2015-12-1 I wrote an example code of error handling to Michal henke in looking for help. He provided the solution based on the solver’s error handling method.

2015-12-2 start to optimize water flux again. I suppressed the carbon allocation and berry growth for this purpose, set them back later.

2015-12-3 for improving the light interception, I make the phyllotax into 137.5

2015-12-4 adding the Gxc buffering part for the leaf transpiration and leaf water potential

2015-12-10 do not delete chart or tables, it makes unable to open the model

2015-12-11 update the seed mass input and thinking about how to change the sugar inhibitor function

2015-12-15 tips for running the model headless

Cmd run as administrator, cd to where is the model, D: cd d:\INRA Bordeaux\FSPM\_GrapeVine\Scripts\

groimpHLWin

adding the model name only works when you are in the address of the model

2015-12-16 adding the protected run in the model and start to add the algorithm for optimizing the carbon allocation

2015-12-23 updated the carbon allocation parameter. 1. Berry mass flow set to zero when the phloem concentration is low; 2. Berry sugar inhibitor set to relates with sugar concentration. 3. Berry fraction of soluble sugar set as a function of sugar concentration in fresh weight (as we do not have good data on g/L); 4. Berry number reduce after 7 days; 5. Stop the nitrogen dynamics when optimize carbon allocation as the leaf N concentration increase too much

* Ambition of 2016: 1. add the early development of the berry growth; 2. add a vegetative growth part to the model; 3. simulate the effect of climate on berry composition; 4. simulate the effect of training system; 5. simulate the dynamics of organic acids.
* write an abstract to NP to see whether they are interested in the integrated model of xylem and phloem
* Inctease both the vmax leaf and root, thus the phlome concentration can reduce
* read literature for water stress and photosynthesis
* write an outline for the paper 1
* run the model on cloud computer
* prepare the presentation and do some new simulations with the updated parameters and environment condition
* Optimize the nitrogen parameters
* optimize first the berry dry matter and then the berry fresh weight
* solve the share folder problem
* check the carbon flux version why the optimized value does not work
* at the current moment, nitrogen content is calculating but I am not updating the leaf N content
* caution during the carbon partitioning optimization, the parameter reading for the vm and km was suppressed
* configure the row arrangement, and run the optimization again
* Add the carbon figures

2016-4-19 due to the differences in versions, e.g. waterflux optimization, carbon optimization, visualization, I decide to create a latest one has all the updated functions. Since the waterflux optimization works well and close to end, so I do not update this.

Furthermore, I created a Boolean variable to control the running differences when read external data or calculate environment variables the model itself.

2016-4-19 I updated the input file to make everything combines into one. I also add lots of running controls in the model input file. Note calculation expressions (non-numbers) in the excel file like c = a\* km, are not readable by the model.

2016-4-21 I finished the sensitivity file of the model. The parameter values were written in an array in the script, running conditions, like temperature, RH, radiation and swc were combined in a excel file that read by the model.

The model output table were also updated, and moved into the folder of model scenarios. Next time, I will not list the information of all the leaves, I will just output the leaf numbers that we are interested, else the table will be too big. R code is available for converting the excel format into the text format for inputting into the model. Do not change the existing sequence anymore.

2016-4-26 Add a PLC (percentage loss of conductivity) function into the water flux optimization part to limit the transpiration under low water potential condition. The idea is discussed with Greg. We found it is necessary to decrease gs\_min in order to reach zero water flux under limiting condition.

2016-4-28 as it is really difficult to optimize transpiration, water potential and ABA simultaneously, due to different time scales in those data and the method. An approximation is taken by optimizing the leaf water potential during the midday.

2016-5-31 I corrected g0 in the calculation of gs by the Tardieu’s method. As in Tardieu’s method, gs is the conductance for water vapor, and the g0 initially is for CO2.

I also add the percentage of loss of conductivity (PLC) as a function of leaf water potential in the calculation of leaf conductance. There is interdependence between leaf water potential and leaf conductance, one iteration is used in the calculation. Leaf conductance was first calculated by the water flux and the water potential of the previous step. Leaf water potential was updated by this leaf conductance. Then leaf conductance and leaf water potential was calculated again.

2016-6-13 run the optimization on HPC again for the final aba production parameter and root conductance. Remember to check the output table when running the optimization. As for simplicity I only output one table

2016-6-14 run the sensitivity of the model to changes in vpd and radiation.

2016-12-23 combine the code of fruit cutting and cane pruning. the current code can switch between training systems.

Updated the method for calculating biomass, direct input, or by proportion between leaf and shoot, or by volume and density

standardized the input file format, organ size, climate conditions, and their naming system

2017-1-3 I created one branch for optimizing the photosynthesis and carbon allocation of bobeica’s data. The good thing for this is that I do not need to switch between conditions when working on different tasks, and easy to merge the changes back to the master, if I wanted.