Yasso graphical user interface manual

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Contents

1. Installation

Yasso graphical user interface is available at Yasso model GitHub https://github.com/YASSOmodel → Yasso-GUI.

Windows: The graphical user interface can be run by unpacking the distributed files to the same directory and executing yasso.exe. Opening the program can take a while.

OSX: The graphical user interface is not currently available for Mac OSX.

2. Structure

Yasso graphical user interface consists of four sheets (Fig. 1). The "All data" sheet has input data to the model. The "Data to use" sheet selects the data used in the simulation. The "Model run" sheet runs the model and selects output options. The "About" sheet gives information on the user interface.
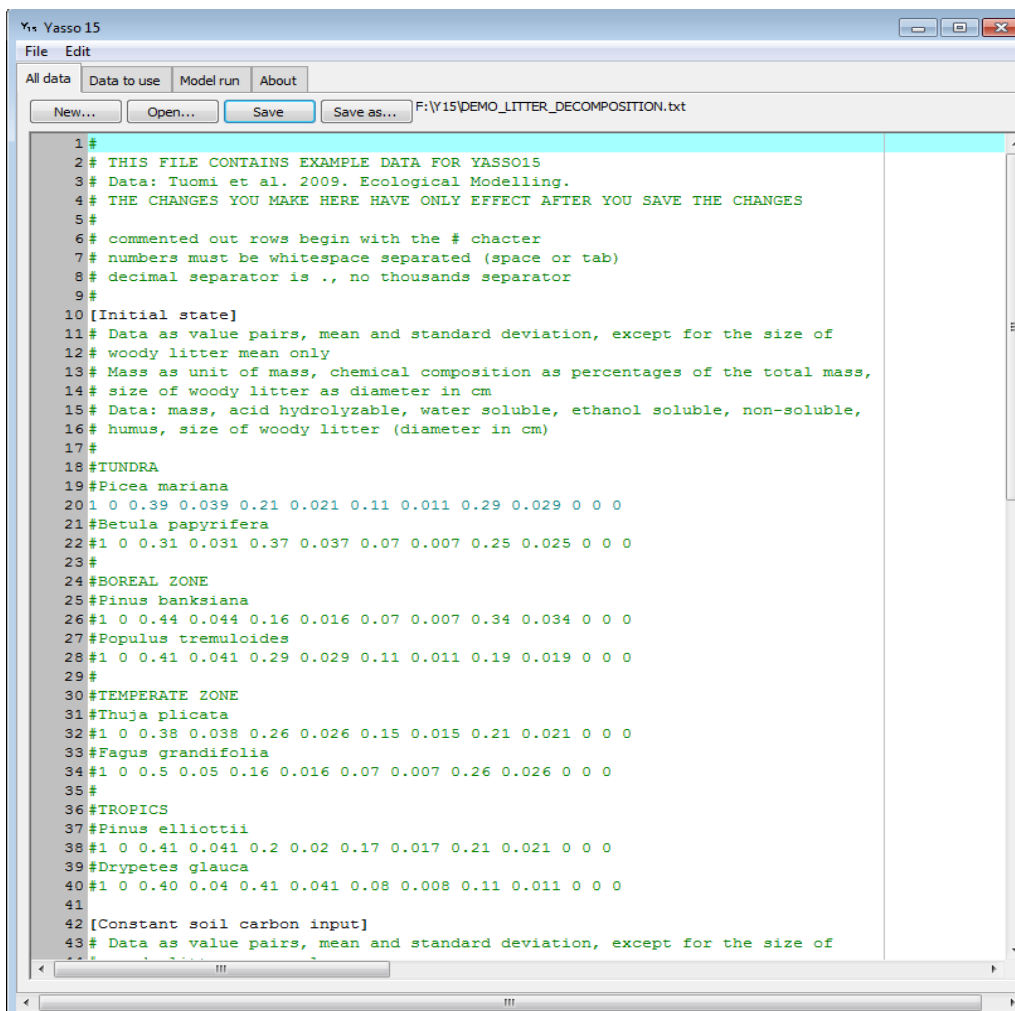

Fig. 1. "All data" sheet of the Yasso graphical user interface.

3. Input data

Input data are given to the Yasso graphical user interface on the "All data" sheet (Fig 1). The data used in the simulation is selected on the "Data to use" sheet (Fig. 2). User must save any changes

made on the "All data" sheet before they take effect on the "Data to use" sheet. The simulations exclude rows beginning with the "#" character. Avoid using special characters and å, ä, and ö letters.

The Yasso graphical user interface requires three kinds of input data, 1) soil carbon stock at the beginning of the simulation, 2) carbon input to the soil during the simulation and 3) climate during the simulation.

3.1 Soil carbon stock at the beginning of the simulation

The soil carbon stock at the beginning of the simulation can be given to the Yasso graphical user interface in three ways, 1) "non zero" means that a user specifies the stock, 2) "zero" means that the stock set to zero or 3) "steady state" means that the user interface calculates the steady-state stock based on the carbon input and climate at the beginning of the simulation (Fig. 2).

The non zero soil carbon stock at the beginning of the simulation is given in terms of Yasso soil carbon model's five chemical compartments, compounds 1) hydrolyzable in acid (denoted with A), 2) soluble in water (W), 3) soluble in a non-polar solvent, ethanol or dichloromethane (E), 4) neither soluble nor hydrolyzable (N) and 5) humus (H). These data are given as a mean and a standard deviation. Examples of chemical compositions of different litter types can be found in various Yasso publications (https://en.ilmatieteenlaitos.fi/yasso-publications).

3.2 Carbon input to soil

Soil carbon input and climate information can be given to the Yasso graphical user interface in three ways, 1) yearly time series, 2) yearly constant values, or 3) monthly time series (Fig. 2).

The soil carbon input information is given in terms of 1) quantity, 2) chemical quality, i.e., the division into the five chemical compartments of Yasso model (see "Soil carbon stock" chapter above), and 3) size of the woody litter. Soil carbon input from plants does not contain humus. Still, the possibility of taking in humus as a part of soil carbon input is included to enable simulating land-use change and the associated additions of soil organic carbon to the simulated land-use class.

Each soil carbon input value is given in a mean and a standard deviation. The standard deviation values are used to calculate uncertainty estimates of the results. The percentages of A, W, E, and N compartments must add up to 100%. The user interface calculates the W compartment percentage based on the A, E, and N compartment values.

Fig. 2. "Data to use" sheet of the Yasso graphical user interface.

3.3 Climate during the simulation

Climate can be given to the Yasso graphical user interface as 1) a yearly time series 2) constant yearly values or 3) a monthly time series. Temperature is given in Celsius (°C) and precipitation in millimeters (mm).

If a simulation is longer than the climate time series is, the simulation starts to use the climate series again from the beginning after reaching the end.

3.4 Leaching parameter:

For comparing the user interface results against litterbag measurements, the user interface can apply a leaching parameter specific to the litterbags' mesh size (Table 3). This leaching parameter is used in Yasso's calibration procedure to account for differences in litterbags and must, therefore, also be accounted for in litterbag comparisons.

Table 1. The mesh sizes of the litterbag experiments and the corresponding leaching parameters.

Origin	Mesh bottom 1 [cm]	Mesh bottom 2 [cm]	Leaching parameter
EURODECO[1]	1	1	-0.154872
CIDET[2]	0.25	0.5	-0.019568
LIDET[3]	0.055	0.055	-0.000167
Hobbie[4]	0.3	0.2	-0.000404
Guendehou[5]	0.33	0.33	-0.917171

1) (Berg *et al.* 1991a, b) 2 (Trofymow 1995), 3 (Gholz *et al.* 2000), 4(Hobbie 2005), 5 (Guendehou *et al.* 2013)

3.5 Parameter set

The parameter set option is used to choose which Yasso model version is used in the simulation.

4. Model run

To run a simulation, the user needs to give the sample size and the number of time steps to the user interface on the "Model run" sheet (Fig. 3). The sample size determines how many parameter combinations the interface uses in the uncertainty simulations. The woody size limit determines the minimum litter diameter plotted in the woody matter graph, but it does not affect the simulation.
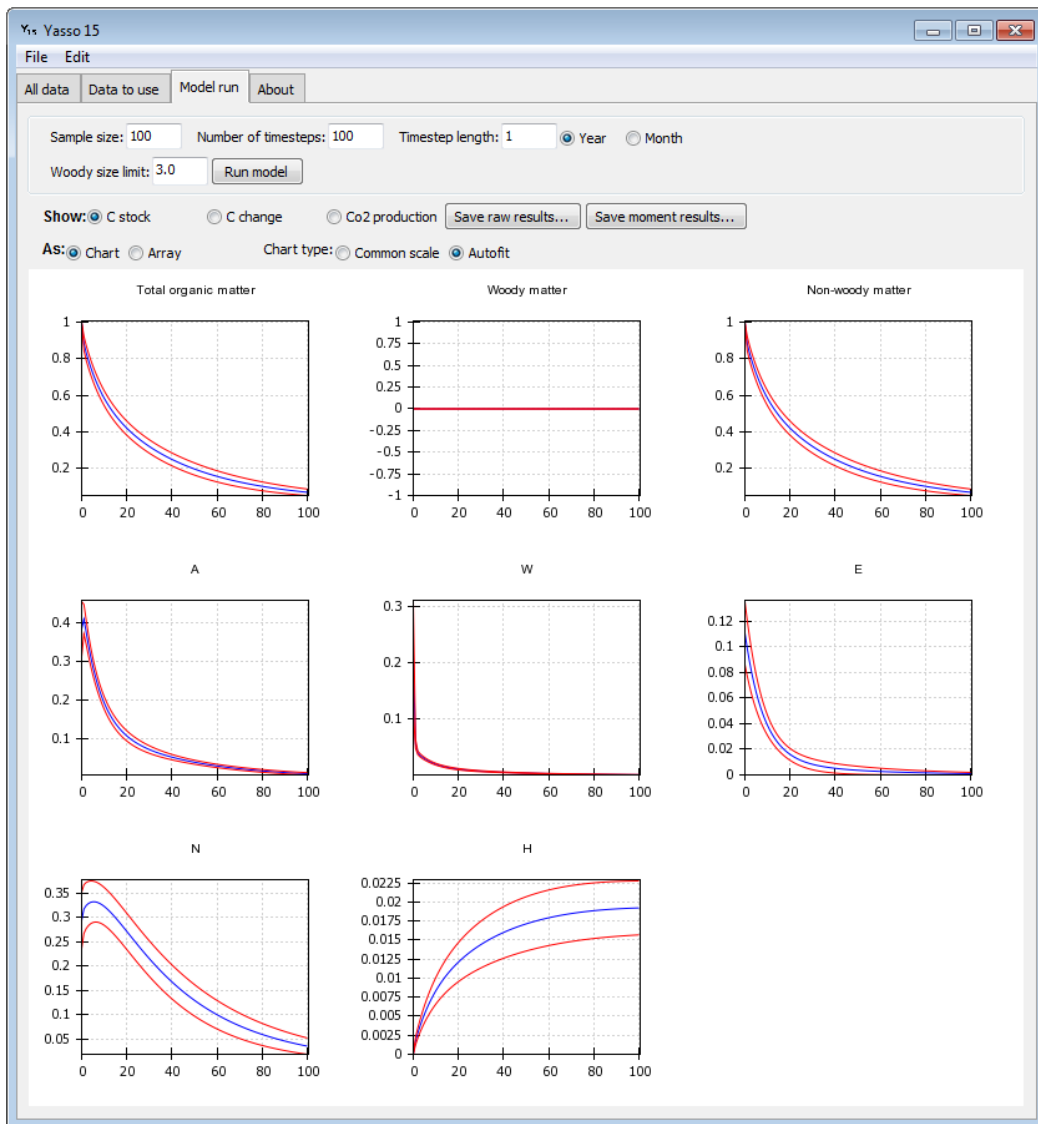
Fig. 3. "Model run" sheet of the Yasso graphical user interface.

5. Results

The Yasso graphical user interface shows the simulation results on the screen (Fig. 3). User can also save them to a file. On the screen, the user interface shows the soil carbon stock, the change in soil carbon by time step, or carbon dioxide production, depending on the user's choice. The graphs illustrate the most probable values and a 95 % probability interval. The user interface shows soil carbon from non-woody or woody litter in separate charts. The division depends on the "Woody size limit" value.

The user can save the simulation results to a file in two formats. The first format is raw results based on each parameter combination used in the simulation. The second format is moment results, which means statistical characteristics calculated from the raw results (Fig. 3). These files are in text format, and they contain a header describing the file contents and settings of the simulation that produced the results.

6. Help

Additional information on Yasso model and contact information can be found on the Yasso web pages at https://en.ilmatieteenlaitos.fi/yasso.

References

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