

BBGCDB tutorial

First steps

Authors: Zoltán BARCZA, Emese BOTTYÁN, Krisztina PINTÉR,
Ferenc HORVÁTH, Dóra KRASSER, Péter ITTZÉS, Laura DOBOR, Dóra HIDY



Abstract

This tutorial introduces the first steps that are needed to run the Biome-BGCMuSo ecosystem model (and also its predecessor, Biome-BGC) using **The Biome-BGC Projects Database & Management System** (in brief, BBGCDB) and the **BioVeL Portal**.

Model execution is based on the so-called workflow technology [specifically, the Taverna workflow] but this is not important from the point of view of practical application of the model. All you need to know is that the model is executed in a distributed hardware/software environment, where everything happens in computers in the “cloud” (i.e. the computational resources of your computer are not used). **All you need to have is a web browser** (we recommend Mozilla Firefox or Google Chrome). No further software are needed (MS Excel is recommended to quickly visualize model results).

Prior to working with the BBGCDB the User should read the User’s Guide for Biome-BGC (or Biome-BGCMuSo, depending on the model to be used).

What do you need to start the work?

Two files are needed for the first simulation (in the simplest case):

1. Meteorology input file
2. Ecophysiological parameters file (EPC)

First, download the two files from this link [zipped]:

<http://nimbus.elte.hu/bbgc/tutorial/input.zip>

Both are pure text files, which can be edited by any text editor (we recommend to use a text editor that can handle both UNIX and Windows style text files. Under MS Windows we recommend the use of Editpad Lite, which is a great and simple text editor:

<http://www.editpadlite.com/>)

Outlook

Once you will get familiar with the model, creation of both the meteorology and the EPC file will be straightforward. For the time being, let's use these existing files.

A separate tutorial will be available to help the construction of the meteorology input file using the MT-CLIM software.

Note that for Central-Europe the FORESEE database provides all data that is needed to run MT-CLIM:

http://nimbus.elte.hu/FORESEE/map_query/index.html

First steps

In order to manage model simulations in a repeatable and organized way **The Biome-BGC Projects Database & Management System** (BBGCDB) is used:

<http://ecos.okologia.mta.hu/bbgcdb/>

First, please contact us to **get an account**:

Dóra KRASSER: dorakra@gmail.com

Ferenc HORVÁTH : horvath.ferenc@okologia.mta.hu

Zoltán BARCZA: zoltan.barcza@ttk.elte.hu

Preparation and uploading input datasets and parameter settings

The first step is the **creation of the LOCATION** for the simulation. The meteorology file will be associated with the **LOCATION**, and the simulation will be also associated with the **LOCATION**.

The study location has to be created only once per site.

All associated projects (Monte-Carlo Experiment, Sensitivity Analysis) are focusing on a predefined location.

Let's open the BBGCDB portal at

<http://ecos.okologia.mta.hu/bbgcdb/>

Preparation and uploading input datasets and parameter settings

At the BBGCDB portal, go to
Preparation Menu → Locations
and there choose **‘Add new location’**.

Biome-BGC Projects Database & Management System 3

Home Used disk space: general 62%, montecarlo 30%, spr 14%

Locations [Add new location](#)

This section contains the **list of locations** where simulation can be performed with Biome-BGC.

2.

Location ID Search in description Keyword Owner

Enter a comma separated list of user names.

Location name	Latitude	Longitude	Altitude	Description	Loc ID
test_loc_HHS	46.96	16.65	248.00m	teszt	4563 edit
Clone of Testpaco, Sonora, Mexico F	27.83	-109.28	460.00m	Secondary tropical dry forest in northwest Mexico.	4440
Testpaco, Sonora, Mexico.	27.83	-109.28	460.00m	Secondary tropical dry forest in northwest Mexico.	4429
TDF Northwest Mexico	27.00	-108.79	383.00m	Tropical Dry Forest, Rancho el Guayabo managed by Nature and Culture Sierra Madre, APFF Sierra Alamos-Rio Cuchujaqui, Alamos, Sonora, Mexico.	4381
Clone of Antisana_project grasslands_Ecuador 4500TU	-0.49	-78.17	4500.00m	grasslands Paramo Antisana Ecuador at 4500 masl for tussocks	4265
Clone of Antisana_project grasslands_Ecuador 4500AR	-0.49	-78.17	4500.00m	grasslands Paramo Antisana Ecuador at 4500 masl for Acaulescent Rosettes	4264
Clone of Antisana_project grasslands_Ecuador 4500CU	-0.49	-78.17	4500.00m	grasslands Paramo Antisana Ecuador at 4500 masl for Cushions	4263

1.

BBGCDB Menu

- News
- ☑ Run projects
- ☑ Projects
- Model versions
- References
- Web services
- ☑ Miscellaneous

Preparation Menu

- ☑ Model inputs
- ☑ Model outputs
- **Locations**
- Site parameters
- Keywords

Preparation and uploading input datasets and parameter settings

Fill in the form. Providing the location name is mandatory. List of existing locations can be retrieved by clicking on **Preparation Menu** → **Locations**. These existing locations are useful to check the content that needs to be provided.

Note that the form needs ‘**Effective soil depth**’ as input. Biome-BGCMuSo does not use this data, but it is still needed as the original Biome-BGC uses it (which is still accessible via BBGCDB).

Preparation and uploading input datasets and parameter settings

Runoff parameter and soil moisture related cells can be left blank. In this case the model will estimate them internally.

Note that soil moisture related parameters should be handled jointly: all fields should be defined by the user OR all fields should be set to fill value to protect consistency of the data.

There are many optional input information (keywords, revisioning, authoring) which can be neglected at this time.

Once finished, save the form. The data can be modified later.



BBGCDB Menu

- News
- Run projects
- Projects
- Model versions
- References
- Web services
- Miscellaneous

Preparation Menu

- Model inputs
- Model outputs
- Locations
- Site parameters
- Keywords

pinterk

- Log out

Create content

- Input file and set
- Location
- Observation
- Output
- Reference
- Site

Supported by:



Create Location

Location name

Location description

Text format

tutorial content
 share with others

Keywords Show row weights

+

Category code

Latitude

Add degrees or decimal value

Degrees

Minutes

Seconds

Direction

N/A
 North
 South

Latitude decimal

Longitude

Add degrees or decimal value

Degrees

Minutes

Seconds

Direction

N/A
 East
 West

Longitude decimal

Example complete location info

In this example we call the site as ‘Tutorial location’.

See the zoomed version of this page on the next five slides.

Create Location

Location name *

Tutorial_Hegyhatsal

This name is only an example, please use a **different name**.

Location description

Demo location for

The „Location description” can be provided in „plain text” or in „filtered html” where the following HTML tags are accepted: `<a>` `` `` `<cite>` `<blockquote>` `<code>` `` `` `` `<dl>` `<dt>` `<dd>`.

Text format Filtered HTML

tutorial content

share with others

Using this option the content will be deleted automatically after two weeks. Please, do not forget to use it when following the tutorial!

Keywords

+ []

+ []

Add another item

Use this option if the site is meant to be public.

Category code

[]

Not used for single runs.

Latitude

Add degrees or decimal value

Degrees [] °

Minutes [] ′

Seconds [] ″

Direction

N/A
 North
 South

Latitude decimal

46.96

Give the coordinates in DMS or in decimal degrees, indicate the direction in both cases.

BBGCDB Menu

- News
- Run projects
- Projects
- Model versions
- References
- Web services
- Miscellaneous



Preparation Menu

- Model inputs
- Model outputs
- Locations
- Site parameters
- Keywords

pinterk

- Log out

Create content

- Input file and set
- Location
- Observation
- Output
- Reference
- Site

Supported by:



▼ Longitude

Add degrees or decimal value

Degrees

Minutes

Seconds

Direction

- N/A
 East
 West

Longitude decimal

Give the coordinates in DMS or in decimal degrees, indicate the direction in both cases.

Altitude *

 m

▼ Default site parameters

effective soil depth (corrected for rock fraction) *

 m

sand percentage by volume in rock-free soil *

 %

Used in model version 4.1.1.

silt percentage by volume in rock-free soil *

 %

Used in model version 4.1.1.

shortwave albedo *

 DIM

wet+dry atmospheric deposition of N *

 kgN/m2/yr

symbiotic+asymbiotic fixation of N *

 kgN/m2/yr

Note that the form needs 'Effective soil depth' as input. Biome-BGCMuSo does not use this data, but it is still needed as the original Biome-BGC uses it (which is still accessible via BBGCDB).

mean annual air temperature *

Celsius

mean annual air temperature range *

Celsius

measured runoff curve number

Biome-BGCMuSo v4 uses a seven-layer soil submodel. The thickness of the layers is fixed: 0-10 cm, 10-30 cm, 30-60 cm, 60-100 cm, 100-200 cm, 200-300 cm and 300-1000 cm. The thickness of bottom (7th, inactive) layer is defined to be 7 m, which is only important for technical reasons (water movement calculations use finite differences method, so for calculating the gradients we need to specify the distance of layers). The depth of each soil layer is represented by the middle level of the given layer (e.g. the thicknesses of the top soil layer is 0.1 m, therefore it is represented at 0.05 m).

[Show row weights](#)

sand percentage by volume in rock-free soil

<input type="text" value=""/>	%

[Show row weights](#)

silt percentage by volume in rock-free soil

<input type="text" value=""/>	%

[Show row weights](#)

bulk density

+	<input type="text"/>	g/cm ³
+	<input type="text"/>	g/cm ³
+	<input type="text"/>	g/cm ³
+	<input type="text"/>	g/cm ³
+	<input type="text"/>	g/cm ³
+	<input type="text"/>	g/cm ³
+	<input type="text"/>	g/cm ³

Show row weights

SWC at SAT

+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³

Show row weights

SWC at FC

+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³

Show row weights

SWC at WP

+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³
+	<input type="text"/>	m ³ /m ³





Show row weights

SWC at HW

- m3/m3

Location link

Title

The link title is limited to 128 characters maximum.

URL

Location contact

Save

After the data input, save the location.

Preparation and uploading input datasets and parameter settings

(Outlook: default site parameters can be redefined later by defining new ‘Site parameters’ that refer to a predefined location. Geographical coordinates and altitude can not be changed.)

Now as the location is defined, we can **upload the meteorology file**.

This can be done in
Preparation Menu → Model inputs → Input data
with clicking on ‘**Add new input data**’

(see next slide)

Preparation and uploading input datasets and parameter settings

Biome-BGC Projects Database & Management System 3

Home > Model inputs Used disk space: general 62%, montecarlo 30%, spr 14%

INPUT Data

Catalogue and description of various **input datasets** related to Biome-BGC modelling environment. Input datasets can be used for construction of scientific investigations (projects) in BBGCDB. Please give meaningful and concise names and descriptions.

Add new input data

1. **Input type** 2.

Model version - Any - **Input type** - Any - **Run type** - Any - **Keyword** - Any

Input ID **Search in description** **Owner** **Apply** **Reset**

Enter a comma separated list of user names.

Input name	ID	Input type	Site	Owner	Dataset file	
bugac_2003_2015_PK_2	4584	Meteorological data	Bugac	pinterk	bugac_2003_2015.mtc43	edit
bugac_2003_2015_PK	4576	Meteorological data	Bugac	pinterk	bugac_2003_2015.mtc43	edit delete
tut_methHHS	4564	Meteorological data	test_loc_HHS	pinterk	tutorial_2001-2010.mtc43	edit
tutorial_methHHS	4561			test a-user		
DRUPAL7 TEST Clone of DEMO in SLC of HHS METDATA 1901-2100 FORESEE REMO	4518	Meteorological data Normal	AGRATÉR VIRTUAL EXPERIMENT SITE 2200	horvfe	TEST_DEMO_HHS_METDATA_1901-2100_FORESEE_REMO.mtc43	
DRUPAL7 TEST Clone of DEMO in SLC of HHS METDATA 1901-1950 for spinup	4517	Meteorological data Spinup or tranzient	AGRATÉR VIRTUAL EXPERIMENT SITE 2200	horvfe	TEST_DEMO_HHS_METDATA_1901-1950_for_spinup.mtc43	
DRUPAL7Clone of DEMO in SLC of HHS METDATA 1901-1950 for spinup	4510	Meteorological data Spinup or tranzient	DEMO in SLC of HHS (HU)	horvfe	TEST_DEMO_HHS_METDATA_1901-1950_for_spinup.mtc43	

BBGCDB Menu

- News
- Run projects
- Projects
- Model versions
- References
- Web services
- Miscellaneous

Preparation Menu

- Model inputs
 - Ini sets
 - EPC parameter test
 - Input data**
 - Observations
 - Parameters to randomise
- Model outputs
 - Locations
 - Site parameters
 - Keywords

Preparation and uploading input datasets and parameter settings

Create Input data

Input name *

Tutorial_Hegyhatsal

Input type *

- Meteorological data
- CO2 Data
- NDEP Data
- EPC Data
- Growing season Data
- Management Data
- Mortality Data
- Groundwater Data
- Conductance Data

Run type

- Spinup or tranzient
- Normal

No selection means both options.

input set description

- share with others
- tutorial content

At the 'Create Input data' form provide a name to the file. This name is only an example, please use a **different name**.

At the 'Input type' select 'Meteorological data'.

Do not click on the 'Run type' buttons if you would like to use the file for both spinup and normal simulation (recommended).

Using this option the content will be deleted automatically after two weeks. Please, do not forget to use it when following the tutorial!

• Preparation and uploading input datasets and parameter settings

Keywords

+

+

Category code

Not used for single runs.

location

At 'location' select the previously defined 'Tutorial site'.

input file

tutorial_2001-2010.mtc43

Year length is always 365 (leap years are not allowed).

Files must be less than 50 MB.
Allowed file types: mtc43 txt zip epc.

At the 'input file' section select the demo meteorology file from your hard drive (tutorial_2001-2010.mtc43; unzip the downloaded file first, of course) then click 'Upload'.

referring literature

Then click 'Save'.

Preparation and uploading input datasets and parameter settings

Now we have a location with meteorology (the latter is called as ‘Tutorial meteorology’ in this document).

Now the ecophysiological parameters have to be supplied.

This can be done once again in
Preparation Menu → Model inputs → Input data
with clicking on ‘**Add new input data**’.

Create Input data

Input name *

Tutorial_Hegyhatsal

Input type *

- Meteorological data
- CO2 Data
- NDEP Data
- EPC Data
- Growing season Data
- Management Data
- Mortality Data
- Groundwater Data
- Conductance Data

model *

Biome-BGCMuSo 4.1

input set description

share with others

tutorial content

Keywords

Category code

input file

Year length is always 365 (leap years are not allowed).

Yeardays: 0-364 (1 Jan: 0 yd)

referring literature

- None -

At the 'Create Input data' form provide a name to the file. This name is only an example, please use a **different name**.

At the 'Input type' select 'EPC Data'.

At the **model** select 'Biome-BGCMuSo 4.1' (description is optional but highly recommended).

Using this option the content will be deleted automatically after two weeks. Please, do not forget to use it when following the tutorial!

At the '**input file**' section select the demo EPC file from your hard drive (c3grass_muso3_tutorial.epc; after unzipping input.zip) then click '**Upload**'. Then click '**Save**'.

Note that this EPC refers to C3 grasslands.

Preparing the simulation

Now let's **prepare the model simulation!**

In terms of Biome-BGC, this means the creation of initialization files ('**Ini sets**' in BBGCDB) that control the spinup (self-initialization or equilibrium) and the consecutive normal run.

See the User's Guide of Biome-BGC for details!

Preparing the simulation

Biome-BGC Projects Database & Management System 3

Home > Model inputs

Used dis

INI sets

[Add new spinup or normal ini set](#) [Add new MCE ini](#)

List of initialization (INI) setting datasets for spinup and normal phase of simulations, or INI setting datasets for Monte Carlo Experiments.

Model version	Input type	Keyword	Input ID
<input type="text" value="- Any -"/>	<input type="text" value="- Any -"/>	<input type="text" value="- Any -"/>	<input type="text"/>
<input type="text" value="Search in description"/>	<input type="text" value="Owner"/>	<input type="text" value="pinterk"/>	<input type="text"/>
<small>Enter a comma separated list of user names.</small>			

BBGCDB Menu

- [News](#)
- [Run projects](#)
- [Projects](#)
- [Model versions](#)
- [References](#)
- [Web services](#)
- [Miscellaneous](#)

Preparation Menu

- [Model inputs](#)
 - [Ini sets](#)
 - [EPC parameter sets](#)
 - [Input data](#)
 - [Observations](#)
 - [Parameters to randomise](#)
- [Model outputs](#)
 - [Locations](#)
 - [Site parameters](#)
 - [Keywords](#)

‘Ini sets’ can be added via
Preparation Menu → Model inputs → Ini sets

with clicking on ‘Add new spinup or normal ini set’ on the right hand side:

Preparing the simulation

Create Ini set

Ini set name *

Tutorial_Hegyhatsal_spinup

Type *

Spinup Ini

Normal Ini

share with others

tutorial content

input set description

Keywords

+

Save keyword here even if it is used in b

Add another item

model *

Biome-BGCMuSo 4.1

Keyword filter

- None -

Filtering input data listed below according

location *

Tutorial_Hegyhatsal [4630]

site parameters

- None -

To overwrite default site parameters of location please choose!

In the 'Ini sets' page fill in the form. Now as this is a tricky thing for the first-time-user, here we explain the necessary settings.

At the 'Create Ini sets' form provide a name to the set. This name is only an example, please use a **different name**.
At the 'Type' select 'Spinup Ini' (later we will create a normal ini as well).

Using this option the content will be deleted automatically after two weeks. Please, do not forget to use it when following the tutorial!

At the 'model' select 'Biome-BGCMuSo 4.1'.

At the 'location' select the location that you previously created (marked by 'Tutorial_Hegyhatsal' in this document).

how many weights



Preparing the simulation

Now let's move to the next big section called '**spinup or normal ini form**'.

In a typical situation Users have to select the meteorology file that he/she or somebody else uploaded previously. In this Tutorial the '**meteorology input filename**' is selected automatically, as BBGCDB related the location to the meteorology. So in our case 'Tutorial meteorology' should be selected.

Due to the intelligent data handling in BBGCDB the form 'knows' that we have 10 years of meteorology data. As we work on spinup simulation, the '**number of simulation years**' is in fact irrelevant, as the spinup meteorology is re-used by the model until equilibrium.

Preparing the simulation

spinup or normal ini form

meteorology input filename *

Tutorial_Hegyhatsal | tutorial_2001-2010.mtc43 | 10 yrs | [4631]

This is selected automatically, see previous slide.

number of simulation years *

10

Ignore if not transient.

CO2_CONTROL *

0=constant

At 'CO2_CONTROL' select '0=constant'. At 'constant atmospheric CO₂ concentration' fill in 280 [ppm] according which refers to preindustrial conditions.

constant atmospheric CO2 concentration

280 ppm

do a ramped N-deposition run? / NDEP_CONTROL *

0=no / constant

At the 'do a ramped N-deposition run?' select '0=no' (spinup simulations typically use constant CO₂ concentration and N deposition).

wet+dry atmospheric deposition of N *

0.000200 kgN/m2/yr

ecophysiological constants (EPC_FILE) *

Tutorial_Hegyhatsal | c3grass_muso4_tutorial.epc | 107 yrs | [4632]

At the 'ecophysiological constants (EPC_FILE)' select the EPC that was uploaded previously (we called it 'Tutorial EPC' in this document).

Preparing the simulation

Outlook: within BBGCDB **location** and **site parameters** are handled separately. Basic site parameters are fixed (geographical location, altitude), while other site parameters (N deposition, soil properties) might be changed by defining site-specific data that belongs to the same location defined earlier. This can be done by

Preparation Menu → Site parameters → Add new site parameters.

During ini set construction alternative site parameters can be selected (not shown in this tutorial). Different N deposition during normal and spinup simulation is a typical reason for Site parameter definition.

Preparing the simulation

The next section is ‘**MuSo data**’. Here we can define ‘growing season parameters’.
(outlook: this can be defined by the User under Preparation Menu → Model inputs → Input data → Add new input data, as ‘Growing season data’ as Input type).

The screenshot shows a web-based configuration interface for 'MuSo data'. It features three main sections: 'growing season parameters' with a text input field containing 'Non woody, default parameters, use GSI | [775]'; 'groundwater data' with a dropdown menu set to '- None -'; and 'referring literature' with a dropdown menu set to '- None -'. A 'Save' button is located at the bottom left. Three yellow callout boxes with red arrows point to these elements: the first points to the 'growing season parameters' field, the second points to the 'groundwater data' dropdown, and the third points to the 'Save' button.

Now select ‘Non woody, default parameters, use GSI’. This setting refers to the HSGSI limits used in Hidy et al. (2012)* for grassland simulations.

These settings control the phenological cycle. At ‘groundwater data’ select ‘-None-’.

Click „Save”

* doi:10.1016/j.ecolmodel.2011.11.008

Preparing the simulation

After saving the form, in the summary page review the settings.

 Tutorial_Hegyhatsal_spinup
[View](#) [Edit](#)

✓ Ini set Tutorial_Hegyhatsal_spinup has been created.

◦ [Clone content](#)

Thu, 2018-03-29 14:40 — pinterk

Ini set (Owner: pinterk, Id: 4640)

Type: Spinup Ini
share with others: unshare
tutorial content: yes
model: Biome-BGCMuSo 4.1
location: Tutorial_Hegyhatsal
Woody/non woody: non woody

◦ spinup or normal ini form

meteorology input filename: Tutorial_Hegyhatsal
number of meteorological data years: 10
number of simulation years: 10
first simulation year: 2001
maximum number of spinup years: 10000
CO2_CONTROL: 0=constant
constant atmospheric CO2 concentration: 280.0ppm
do a ramped N-deposition run? / NDEP_CONTROL: 0=no / constant
wet+dry atmospheric deposition of N: 0.000200 kgN/m2/yr
ecophysiological constants (EPC_FILE): Tutorial_Hegyhatsal

◦ MuSo data

management data: No management
growing season parameters: Non woody, default parameters, use GSI

Preparing the simulation

BBGCDB lists the first year of the meteorology file that was uploaded (2001 in this example). In our case this 10-years-long dataset is used for spinup, as we did not upload meteorological data for other time periods. This is a typical way for doing spinup, though we know that we provide meteorological data under changing climate.

Maximum number of spinup years means the maximum length of the equilibrium run. Equilibrium is typically found within 2-3000 years during the spinup.

It is clear from the summary page that clay content of the soil is calculated as the residual of sand and silt.

Preparing the simulation

Now we have to create another ini set, which will control the normal simulation (this is what the User actually needs). This can be done in the same way as we did it for the Spinup ini.

Biome-BGC Projects Database & Management System 3

Home > Model inputs

Used disk space: general 62%, montecarlo 30%, spr 14%

INI sets

Add new spinup or normal ini set Add new MCE ini

List of initialization sets for Monte Carlo Experiments.

Model version: - Any -

Search in description:

Owner: pinterk

Enter a comma separated list of user names.

Input name	ID	Model	Input type	Site	Owner
Bugac_MCE_PK_1	4586	Biome-BGCMuSo 4.1	MCE Ini		pinterk edit
bugac_normal_PK	4582	Biome-BGCMuSo 4.1	Normal Ini	Bugac	pinterk edit
bugac_spinup_PK	4577	Biome-BGCMuSo 4.1	Spinup Ini	Bugac	pinterk edit
HHS_teszt2_norm	4572	Biome-BGCMuSo 4.1	Normal Ini	test_loc_HHS	pinterk edit
HHS_teszt2	4571	Biome-BGCMuSo 4.1			
teszt_norm_ini	4567	Biome-BGCMuSo 4.1			
teszt_ini_HHS	4566	Biome-BGCMuSo 4.1			

BBGCDB Menu

- News
- Run projects
- Projects
- Model versions
- References
- Web services
- Miscellaneous

Preparation Menu

- Model inputs
 - Ini sets**
 - EPC parameter sets
 - Input data
 - Observations
 - Parameters to randomise
- Model outputs
 - Locations
 - Site parameters
 - Keywords

Powered by Drupal

1. Go to Preparation Menu → Model inputs → Ini sets

2. Click on 'Add new spinup or normal ini set' on the right hand side.

Preparing the simulation

Create Ini set

Ini set name *

Tutorial_Hegyhatsal_normal

Type *

Spinup Ini

Normal Ini

share with others

tutorial content

input set description

Empty text area for input set description.

Show row weights

Keywords

Keyword input field with a plus icon and a search icon.

Save keyword here even if it is used in below filter!

Add another item

model *

Biome-BGCMuSo 4.1

Keyword filter

- None -

Filtering input data listed below according to a keyword given previously.

location *

Tutorial_Hegyhatsal [4630]

site parameters

- None -

To overwrite default site parameters of location please choose!

At the 'Create Ini sets' form provide a name to the set ('Ini set name'; In this example we call the Ini set as "Tutorial normal ini"). This name is only an example, please use a **different name**.

At the 'Type' select 'Normal Ini'.

Using this option the content will be deleted automatically after two weeks. Please, do not forget to use it when following the tutorial!

At the 'model' select 'Biome-BGCMuSo 4.1'.

At the 'location' select the location that you previously created (marked by 'Tutorial_Hegyhatsal' in this document).

Preparing the simulation

spinup or normal ini form

meteorology input filename *

Tutorial_Hegyhatsal | tutorial_2001-2010.mtc43 | 10 yrs | [4631]

number of simulation years *

10

CO2_CONTROL *

0=constant

constant atmospheric CO2 concentration

385.800 ppm

do a ramped N-deposition run? / NDEP_CONTROL *

0=no / constant

wet+dry atmospheric deposition of N *

0.0002 kgN/m2/yr

ecophysiological constants (EPC_FILE) *

Tutorial_Hegyhatsal | c3grass_muso4_tutorial.epc | 107 yrs | [4632]

For ‘constant atmospheric CO2 concentration’ let’s define 385 ppm which refers to present-day conditions (of course in reality CO₂ concentration changes year by year).

At the ‘do a ramped N-deposition run?’ select ‘0=no’

At the ‘ecophysiological constants (EPC_FILE)’ select the EPC that was uploaded previously (we called it ‘Tutorial EPC’ in this document).

Outlook: In a more complex simulation annually varying CO₂ concentration can be used during model simulation (after creation of input data called ‘CO2 data’). Also, it is possible to use annually varying N deposition. See User’s Guide for explanation, and also check out the new ‘transient’ option of the spinup simulation.

Preparing the simulation

The ‘**MuSo, other data**’ section differs from the one that we filled in during the creation of the Spinup ini.

The screenshot shows a web interface for configuring simulation data. It features several dropdown menus, each with '- None -' selected. The sections are: 'growing season parameters', 'management data', 'mortality data', 'groundwater data', 'conductance data', and 'referring literature'. A large yellow callout box with a brown border is overlaid on the 'management data' dropdown, containing the text: 'Now we see that there is an option for management (mortality, groundwater and conductance should be ignored in this simple simulation). In this example we do not use management, so let's select '-None-'. A red arrow points from the bottom of this callout box to a 'Save' button at the bottom left of the form. Another yellow callout box with a brown border is positioned over the 'Save' button, containing the text: 'Click „Save”'.

Outlook: management data (e.g. mowing, fertilization, etc.) can be defined by the User under Preparation Menu → Model inputs → Input data → Add new input data as ‘Management data’ as Input type.

Preparing the simulation



Tutorial_Hegyhatsal_normal

View Edit

✓ Ini set *Tutorial_Hegyhatsal_normal* has been created.

◦ Clone content

Thu, 2018-03-29 14:53 — pinterk

Ini set (Owner: pinterk, Id: 4641)

Type: Normal Ini

share with others: unshare

tutorial content: yes

model: Biome-BGCMuSo 4.1

location: Tutorial_Hegyhatsal

Woody/non woody: non woody

▽ spinup or normal ini form

meteorology input filename: Tutorial_Hegyhatsal

number of meteorological data years: 10

number of simulation years: 10

first simulation year: 2001

maximum number of spinup years: 10000

CO2_CONTROL: 0=constant

constant atmospheric CO2 concentration: 385.8ppm

do a ramped N-deposition run? / NDEP_CONTROL: 0=no / constant

wet+dry atmospheric deposition of N: 0.000200 kgN/m2/yr

ecophysiological constants (EPC_FILE): Apriori_MuSo3 maize -C4 -CGR set 1

▽ MuSo data

management data: No management

growing season parameters: Non woody, default parameters, use GSI

Save the form! The summary page shows all settings. Let's review the page to make sure that the settings are good.

Running the simulation

Now, we are ready to run our first simulation!

BBGCDB Menu

- News
- Run projects
 - Run CARBON
 - Run MCE
 - Run SA
 - Run GLUE
- Projects
 - All projects
 - CARBON projects
 - ESI Projects
 - MCE Projects
 - SA Projects
 - GLUE Projects
 - DOC Projects

Create Project CARBON

Biome-BGC is a process-based biogeochemical model that can be used to simulate carbon, nitrogen and water fluxes of different terrestrial ecosystems. The BBGC Single Run executes a simulation run, which consists of a so called "spinup" and "normal" simulation phases pipelined.

Name of the Biome-BGC CARBON project simulation run *

share with o

Project description

Brief description of this run (optional).

Model version *

Biome-BGC 4.1.1 Max Planck Institute

Several model versions were implemented. Please select from the list.

Keyword filter

- None -

Filtering location, spinup ini, normal ini and output type settings listed below according to a keyword given previously.

Location

- None -

Filtering dataset according to the location can be a helpful option.

It can be done under BBGCDB Menu → Run projects → Run CARBON

Running the simulation

Create Project CARBON

Biome-BGC is a process-based biogeochemical model of terrestrial ecosystems. The BBGC Single Run executes a simulation run

Name of the Biome-BGC CARBON project

Tutorial_Hegyhatsal_run

share with others

tutorial content

Project description

Brief description of this run (optional).

Model version *

Biome-BGCMuSo 4.1

Several model versions were implemented. Please select from the list.

Keyword filter

- None -

Filtering location, spinup ini, normal ini and output type settings listed below according to a keyword given previously.

Location

Tutorial_Hegyhatsal [4630]

Filtering dataset according to the location can be a helpful option.

Fill in the 'Name of the Biome-BGC project simulation run' (in this example we use the 'Tutorial_Hegyhatsal_run project' name, please use a different one).

Using this option the content will be deleted automatically after two weeks. Please, do not forget to use it when following the tutorial!

At 'Model version' select 'Biome-BGCMuSo 4'.

Ignore keywords by now.

Select the location that you defined in the beginning ('Tutorial_Hegyhatsal' in this document).

Running the simulation

INITIALISATION

Biome-BGC spinup INI dataset *

Tutorial_Hegyhatsal_spinup - [4633] ▼

Biome-BGC normal INI dataset *

Tutorial_Hegyhatsal_normal - [4634] ▼

Output type *

Tutorial output set [2423]

Save

Within the 'INITIALISATION' block select predefined 'Biome-BGC spinup INI dataset' and 'Biome-BGC normal INI dataset'. In this tutorial we called them 'Tutorial spinup ini' and 'Tutorial normal ini'.

The final moment is the selection of 'Output type'. For the sake of simplicity, select 'Tutorial output set'.

Then click 'Save'.

Outlook: At a later stage you will be able to define your own output type using the Preparation Menu → Model outputs → Output sets with clicking on 'Add new output set'.

Running the simulation

 Tutorial_Hegyhatsal_run

[View](#) [Edit](#)

 Project CARBON *Tutorial_Hegyhatsal_run* has been created.

Thu, 2018-03-29 15:01 — pinterk

Project CARBON (Owner: pinterk, Id: 4642)

Share with others: unshare

tutorial content: yes

Project description:

Project status: planned

Model version: Biome-BGCMuSo 4.1

Location: Tutorial_Hegyhatsal

 INITIALISATION

Biome-BGC spinup INI dataset: Tutorial_Hegyhatsal_spinup

Biome-BGC normal INI dataset: Tutorial_Hegyhatsal_normal

Output type: Tutorial output set

[Execute](#)

← After checking the summary of the run, click 'Execute'.

Working with the results

 Tutorial_Hegyhatsal_run

[View](#) [Edit](#)

Project (id: 4649) has been started.

Thu, 2018-03-29 15:43 — pinterk

Project CARBON (Owner: pinterk, Id: 4649)

Share with others: unshare

tutorial content: yes

Project description:

Project status: closed

Project start time: 2018-03-29 15:43

Project end time: 2018-03-29 15:43

Model version: Biome-BGCMuSo 4.1

Location: Tutorial_Hegyhatsal

INITIALISATION

Biome-BGC spinup INI dataset: Tutorial_Hegyhatsal

Biome-BGC normal INI dataset: Tutorial_Hegyhatsal

Output type: Tutorial output set

Outputs

Result file:  4649_result.zip

[Link to the result directory](#)

The results of the simulation can be downloaded via clicking on the link provided by the **‘Result file’** section (4649_result.zip in our example).

The User can also see the results of the simulation by clicking on the **‘Link to the result directory’** link. In this latter case the output files can be downloaded one by one. Note that the input files [native Biome-BGCMuSo files, which are constructed by the database] are also found there.

Postprocessing with Excel

After downloading, unzip the result file (4649_result.zip in this tutorial). As the presented project focused on daily data, we will visualize data from the **dayout.csv** file.

Note that originally Biome-BGC provides so-called ‘flat binary’ files (i.e. binary files without header, for further details see Section 4.1 in the [user guide](#)) as output (exception is the annual summary file). BBGCDB converts the results to csv for simple post-processing.

Postprocessing with Excel

If we open the **dayout.csv** file in Excel we will get the daily resolution model results in columns.

Year is the first column, day of year is the second column (note that each year consists of 365 days according to the model logic; see User's Guide), then the different output variables are listed.

In the first line numbers denote the specific output variables. The meaning of the numbers can be retrieved by clicking on the link after **Output type** (in our case ;Tutorial output set') on the summary page of the project at BBGCDB!

Working with the results

Home



Tutorial output set

View

Clone

Sun, 2015-06-07 21:13 — bzoli

Output (Owner: bzoli, Id: 2423)

share with others: share with others

model: Biome-BGCMuSo 4.0

output control

write daily output

no monthly avg

no annual avg

no annual output

daily output:

wf->evapotransp (34)

epc.vwc[0] (546)

summary.daily_npp (620)

summary.daily_gpp (623)

summary.soilc (638)

SoilRes

summary.daily_tr (649)

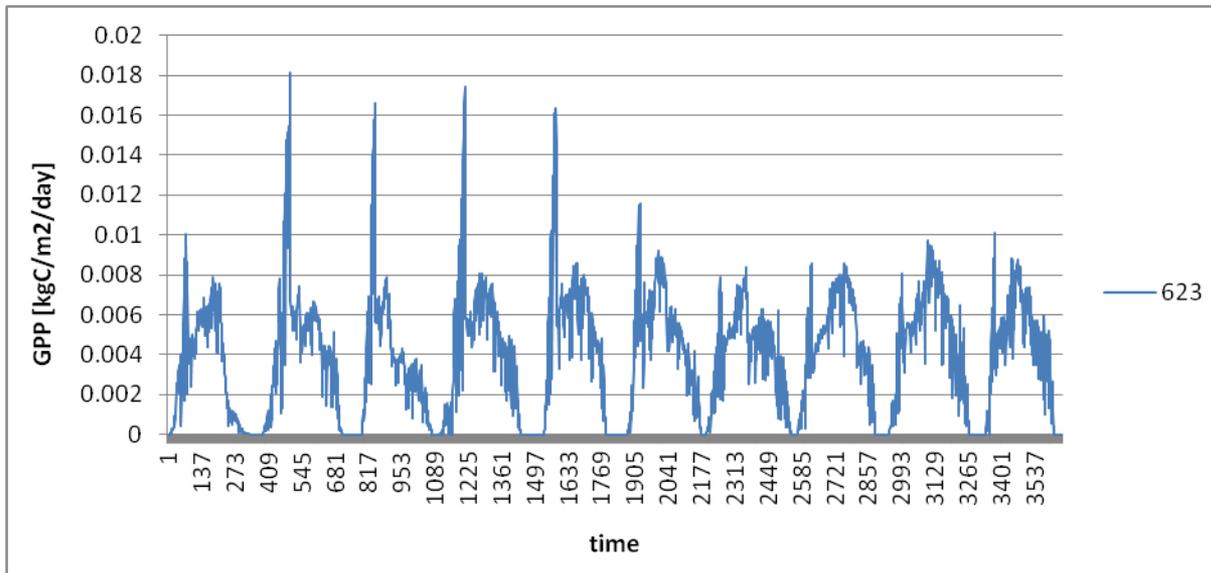
This content can not be deleted! The following projects are refering it.

The numbers mean the following:

- **34** means evapotranspiration (ET; $\text{kgH}_2\text{O}/\text{m}^2/\text{day}$),
- **546** is the soil water content at the uppermost soil layer (0-10 cm; m^3/m^3),
- **620** means daily NPP ($\text{kgC}/\text{m}^2/\text{day}$),
- **623** is GPP ($\text{kgC}/\text{m}^2/\text{day}$),
- **638** is total soil C (kgC/m^2),
- **648** is soil respiration ($\text{kgC}/\text{m}^2/\text{day}$; not visible in the example image but we can figure it out from the order of variables),
- **649** is total ecosystem respiration ($\text{kgC}/\text{m}^2/\text{day}$).

Postprocessing with Excel

Let's quickly plot GPP with Excel (variable 623)!



Let's finish this tutorial with this image!

Working with the results

Congratulations – you have successfully completed your first Biome-BGCMuSo simulation using our infrastructure!