

Contents

1	Ger	neral overview	. 1
2	App	plication components	.1
3	Me	nu options	3
1		r constinc	, J D
4	USE		
	4.1	Create a new project	.3
	4.2	Calibrating an existing project	.6
5	Pro	ject status1	10

1 General overview

gSWAT is both a platform and an application. The **gSWAT** application allows the user to calibration the SWAT models in a flexible and interactive manner by taking advantage of the Grid infrastructure. The graphical user interface links the user to the Grid infrastructure in a flexible and transparent way. It uses intuitive user interaction techniques that allow different categories of users to use the application. **gSWAT** is a Web application that may be used by specialists in calibration process of the SWAT models or by students who are learning the calibration process. For the calibration process, which is computational intensive and needs a lot of storage space, the Grid infrastructure offers a distributed execution environment and storage space as well for the outputs generated by SWAT.

2 Application components

The application interface consists of five general modules:

- **Menu**: placed on the top of the application; the menu options are related only to projects (e.g.: open is used to open a project) section 1 from Figure 1.
- **Projects list**: contains all the projects created by the user section 2 from Figure 1.
- **Project information:** the right hand side window, next to the projects list section 3 from Figure 1.
- **Search and filter options**: the user can search projects by name and description keywords. Also a filtering system helps the user to find the desired projects section 4 from Figure 1.

- **Calibration page**: is automatically activated when the user opens a project using the Open item form the menu bar - Figure 2.

1 ^{2,430}	
enviroGRIDS Default project - g SWAT Calibration	
New Open Delete Edit Stop calibration Upload System	m log Snapshot Log out
Search project by keywords Search Display filters 🕥	4
Projects List	Project information
Default project Created at: January, 9th, 2012 Status: Finished iteration	Name:Default projectCreated at:January, 9th, 2012Executing since:-Last action:Finished iterationOpen logsArc Swat model:2009 versionDescription:Test project
2	Output results:

Figure 1. The gSWAT Graphical User Interface

www.cordination							
Start calibration Save iteration	Delete iteration Save Save all Close tabs Project logs Snapshot C	Close project					
Project status: Loaded project	par_inf. ×						
Project Explorer	1 14 : Number of Parameters						
Executable Files	3 20 : number of simulations 4 5						
Iterations history	6						
🔻 🗁 Calibration Inputs							
🗋 file.cio	9 r_CN2.mgt -0.5 0.5						
SUFI2_extract_rch.def	10 11 v_ALPHA_BF.gw 0.0 1.0						
trk.txt	12 v_GW_DELAY.gw 30.0 450.0						
observed_rch.txt	15 v_GWQMN.gw 0.0 2.0						
par_inf.txt	16 17 v CW PEVAR mw 0.0 0.2						
observed_hru.txt	18	_					
observed_sub.txt	19 v_ESCO.hru 0.0 1.0						
🗋 var_file_sub.txt	20 21 v_CH_N2.rte 0.0 0.3						
var_file_hru_No_obs.txt	22						
🗋 observed.txt	23 v_CH_K2.rte 5.0 130.0 24						
🗋 var_file_sub_No_obs.txt 🔻	25 v_ALPHA_BNK.rte 0.0 1.0	v					

Figure 2. The gSWAT Graphical User Interface – Calibration page

3 Menu options

- New: create new project
- **Open:** open for editing an existing project (accepts only projects with **Loaded project**, **Running iteration**, **Finished iteration** statuses)
- **Delete**: remove a project permanently from the projects list and from general database
- Edit: allows the user to change the name and the description of an already created project
- **Stop calibration**: allows the user to cancel the calibration process for the selected project.
- **Start/Stop upload**: used when the user loads the TxtInOut folder to the server/ The user can stop the calibration process any time he wants.
- **System log**: history of the application operations made by the user. This section displays to the user different information like: the date when a projects successfully ends its' calibration, when new project was created, when an upload operation ended, etc.

4 User scenarios

4.1 Create a new project

The following steps are required to create a new SWAT project:

- 1. Click on the **New** menu option (Figure 3).
- 2. Provide the name and the description for the project and then click on the **CREATE PROJECT** button click (Figure 4).
- 3. Click on the **Browse** button (Figure 5).
- 4. Select the SWAT model, which must be an archive of the TxtInOut folder (Figure 6).
- 5. The gSWAT system will process and upload the model to the Storage Element (Figure 7).

enviroGRIDS Lefault	project - gs	SWAT C	alibration						
New Cpen	Delete	Edit	Stop calibration	Upload	System logs	Snapshot	Log out		
Search project by	keywords		Search	Display filt	ers 💽				
Projects List					P	roject informatio	on		
Default project Created at: Status:	: Finished it	i, 2012 eration				Name: Created at: Executing since: Last action: Arc Swat model: Description:	Default project January, 9th, 2012 - Finished iteration 2009 version Test project	<u>Open loas</u>	

Figure 3. Create new project – step 1

myrogect - gSWAT Calibration	1	
New Open Delete Edit Stop o	alibration Upload System lo	n logs Snapshot Log out
Search project by keywords Search	Display filters 🕤	
Projects List		Create a new project
Default project Created at: January, 9th, 2012 Status: Finished iteration		Name: Test project Description: Black Sea Catchment test project
		TxtInOut created with: ArcSwat 2005

Figure 4. Create new project – step 2

enviroGRIDS Test project - g SWAT Calibra	ation					
New Open Delete Edit	Stop calibration Upload	System logs	Snapshot	Log out		
Search project by keywords	Search Display	ilters 🕤				
Projects List		Uplo	oad project fil	es —		
Test project Created at: January, 9th, 2012 Status: Empty project			TxtlnOut archive	location:	test_txtinout.zip (1 MB)	Browse
Status: Empty project Default project Created at: January, 9th, 2012 Status: Finished iteration						Browse to TxtInOut folder location

Figure 5. Create new project – step 3



Figure 6. Create new project – step 4

enviroGRID	in GRIDS Test project - g SWAT Calibration										
New	Open	Delete	Edit	Stop calibration	Upload	System log	is Snapshot	Log out			
Search p	roject by	keywords		Search	Display filt	ers 🕤					
Project	s List					P	Project information	on			
Test pro Cre Sta	oject ated at: tus:	Processin	g files				Name: Created at:	Test project January, 9th, 2012			
Default	project	t lanuary Ott	2012				Executing since:	-			
Sta	ateu at: tus:	Finished it	eration				Last action:	Uploading project Open logs			
							Arc Swat model:	2009 version			
							Description:	Black Sea Catchment test project			

Figure 7. Create new project – step 5

4.2 Calibrating an existing project

Only projects with **Loaded project** and **Finished iteration** statuses could be calibrated. For the calibration process the next steps are required:

- 1. The user selects a project (from the project list) and uses the **Open** menu bar option (Figure 8).
- 2. On the next page, the user can select a file (from Calibration Inputs, Executable Files or Calibration Outputs) to edit (Figure 9). The file editing is done by double clicking the file. On file double click this file opens in a new tab.
- 3. The calibration process is launched by using the **"Start Calibration"** menu bar option (Figure 10).
- 4. The user is informed about the calibration status (Figure 11).
- 5. After a successful execution, the user can visualize the output results (Figure 12).
- 6. He can also visualize the results as charts (Figure 13).
- 7. The user can turn on the tool tips that will be displayed on charts (Figure 14).

enviroGRI	S Test pr	oject - gSW	AT Calib	ration				
New	Open	Delete	Edit	Stop calibration	Upload	System logs	Snapshot	Log out
Search p	oroject by	keywords		Search	Display filt	ers 🕤		
Projec	ts List					Pro	ject informati	on
Test pr Cre Sta	oject eated at: atus:	January, 9th Loaded pr	n, 2012 oject				Name: Created at:	Test project January, 9th, 2012
Defaul	t project	lanuari 0#	0040				Executing since:	:-
Sta	eated at: itus:	Finished it	teration				Last action:	Loaded project Open logs
							Arc Swat model:	2009 version
							Description:	Black Sea Catchment test project
							Open project	

Figure 8. Calibration – step 1

Test project - gSWAT Calib	ration	
Start calibration Save iteration	Delete iteration Save Save all Close tabs Project logs Snapshot	Close project
Project status: Loaded project	🖻 par_inft 🗙	
	1 14 : Number of Parameters	A
Project Explorer	3 20 : number of simulations	
▶ 🗀 Executable Files	4 5	
Iterations history	6	
🔻 🚞 Calibration Inputs	7	
📄 file.cio	9 r_CN2.mgt -0.5 0.5	
SUFI2_extract_rch.def		
var_file_hru.txt	12	
🗋 trk.txt	13 v_GW_DELAY.gw 30.0 450.0	
observed_rch.txt	14 15 v_GWQMN.gw 0.0 2.0	
i par_inf.txt	16	
observed_hru.txt	17 v_GW_REVAP.gw 0.0 0.2	
observed_sub.txt	19 v_ESCO.hru 0.0 1.0	
var_file_sub.txt	20 21 v CH N2 the 0.0 0.3	
var_file_hru_No_obs.txt	22	
observed.txt	23 v_CH_K2.rte 5.0 130.0	
var_file_sub_No_obs.txt 🔻	25 v_ALPHA_BNK.rte 0.0 1.0	•

Figure 9. Calibration – step 2

Test project - gSWAT Calibration								
Start calibration	Save iteration	Delete iteration Save Save all Close tabs Project logs Snapshot Close	e project					
Project status: Loa	ded project	par_inft par_inft 1 14 : Number of Parameters	4					
Project Explored	r 🔺	2 3 20 : number of simulations 4 5 6						
Calibration Input Calibration Input Ifile.cio SUFI2_extrac Var_file_hru.t trk.bt observed_rct par_inf.bt	ts st_rch.def xt h.bt	7 8 9 rCN2.mgt -0.5 0.5 10 11 v_ALPHA_BF.gw 0.0 1.0 12 13 vGW_DELAY.gw 30.0 450.0 14 15 vGWQMN.gw 0.0 2.0 16 17 v_GW_REVAP.gw 0.0 0.2						
observed_su var_file_sub. var_file_hru observed.tkt var_file_sub	lb.bt bt No_obs.bt No_obs.bt	18 19 v_ESCO.hru 0.0 1.0 20 20 21 v_CH_N2.rte 0.0 0.3 22 23 v_CH_K2.rte 5.0 130.0 24 25 v_ALPHA_BNK.rte 0.0 1.0	v					





Figure 11. Calibration – step 4

nvirvGRIDS Test project - g SWAT Calibration									
Start calibration Save iteration	Delete iteration Save Save all Close tabs Project logs Snapshot	Close project							
Project status: Finished iteration	par_inf.bt new_pars.t×								
	1 par_no par_name new_min new_max								
Project Explorer	2 3 r_CN2.mgt -0.148662 0.698662								
▶ 🗀 Executable Files	4 v_ALPHA_BF.gw -0.328974 0.578974 5 v_GW_DELAY.gw 175.306580 493.693420								
Iterations history	6 v_GWQMN.gw -0.660326 1.160326								
Calibration Inputs	7 v_GW_REVAP.gw 0.094534 0.295466 8 v_ESC0.bru 0.345425 1.104575								
🔻 🗁 Calibration Outputs	9 v_CH_N2.rte -0.076760 0.181760								
95ppu.txt	10 v_CH_K2.rte -54.838306 71.088310								
	11 v_ALPHA_BNK.rte 0.370273 1.179727								
	12 I_SOL_AWC(1):sol -0.022584 0.372584								
new_pars.txt	14 r_SOL_BD(1).sol -0.284784 0.329785								
best_sim.txt	15 v_SFTMP.bsn -1.762503 5.262503								
🗋 best_par.txt	16 v_T_OPT{30}.CROP.DAT -0.136762 0.026762								

Figure 12. Calibration – step 5



Figure 13. Calibration – step 6



Figure 14. Calibration – step 7

5 Project status

Each project may have one of the following statuses:

- **Empty project**: the project was created, but no TxtInOut folder was uploaded by the user.
- **Uploading project**: the uploading process of the TxtInOut folder is in progress.
- **Incomplete uploading**: the uploading process for an existing project was interrupted by various motives (e.g.: internet failure, by user, etc).
- Loaded project: the uploading process ended with success.
- **Running iteration**: when a project is in the calibration phase.
- **Incomplete iteration**: the calibration process for the current project fails due to internet problems or incorrect input data.
- **Finished iteration**: the calibration process ends successfully for the current selected project.