gSWAT – SWAT Model Calibration

Contents

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.
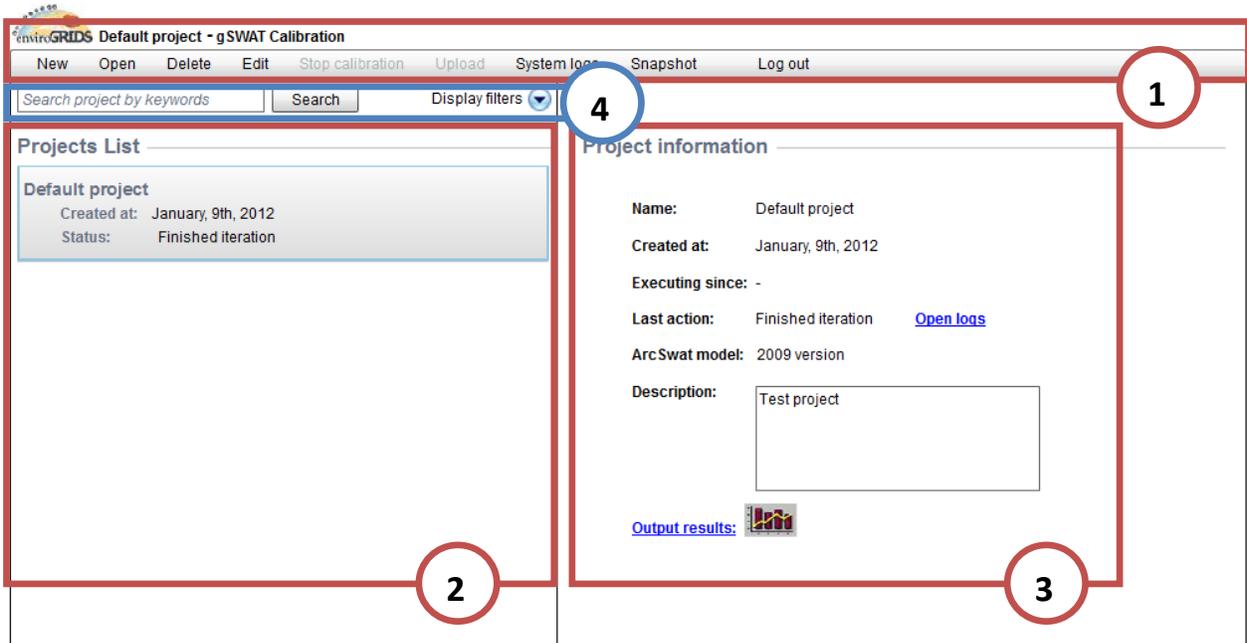

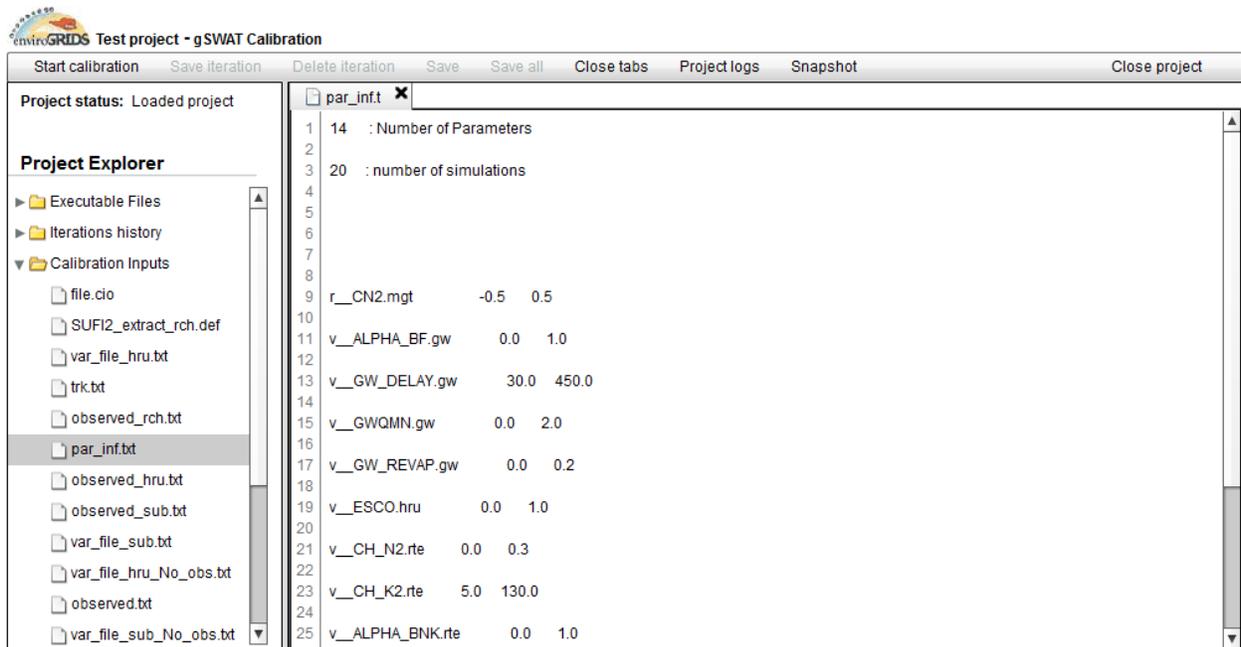**Figure 1. The gSWAT Graphical User Interface**

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).
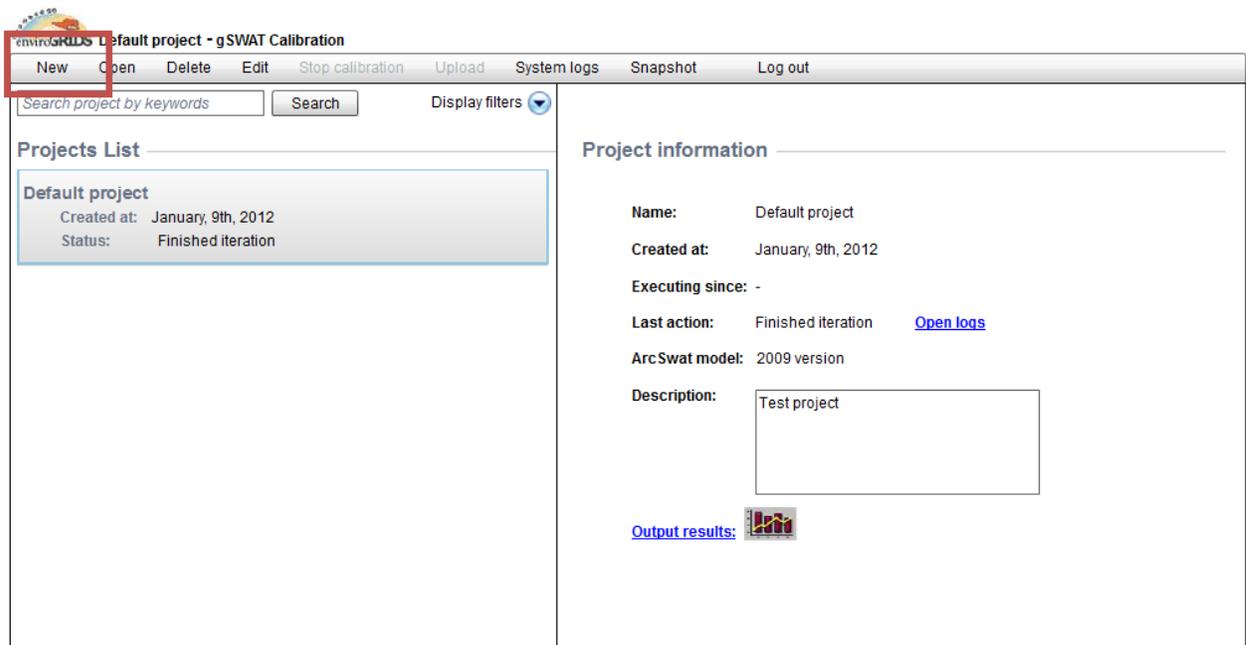5. The gSWAT system will process and upload the model to the Storage Element (Figure 7).

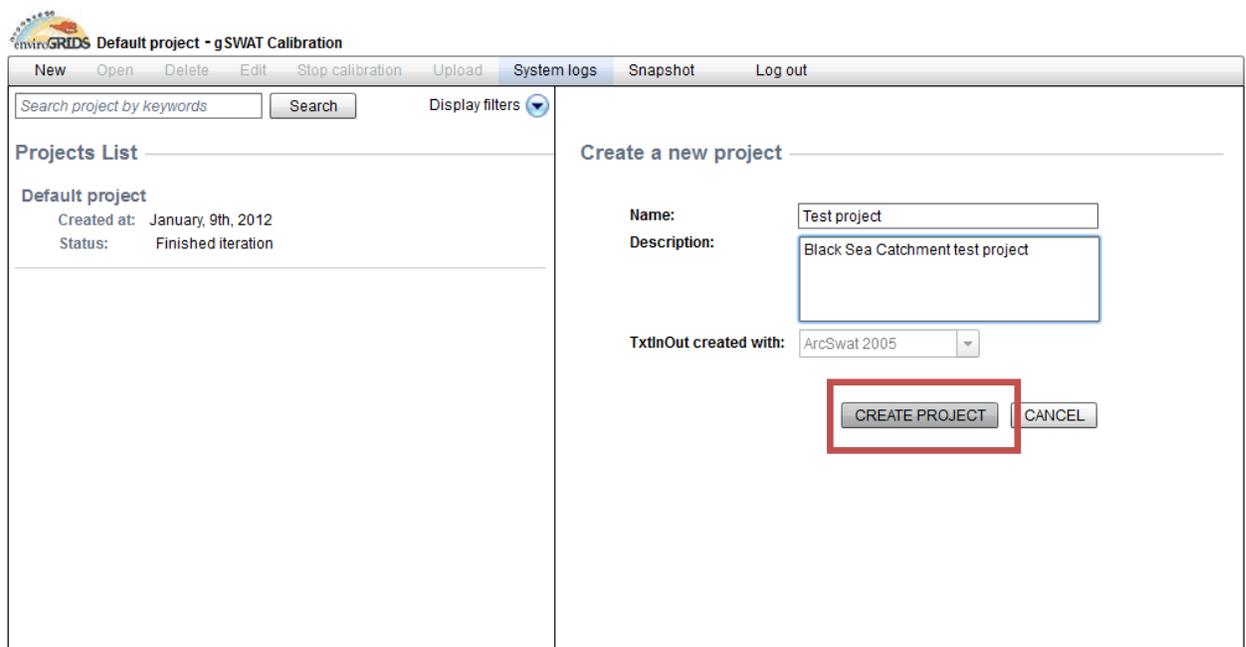**Figure 3. Create new project – step 1**
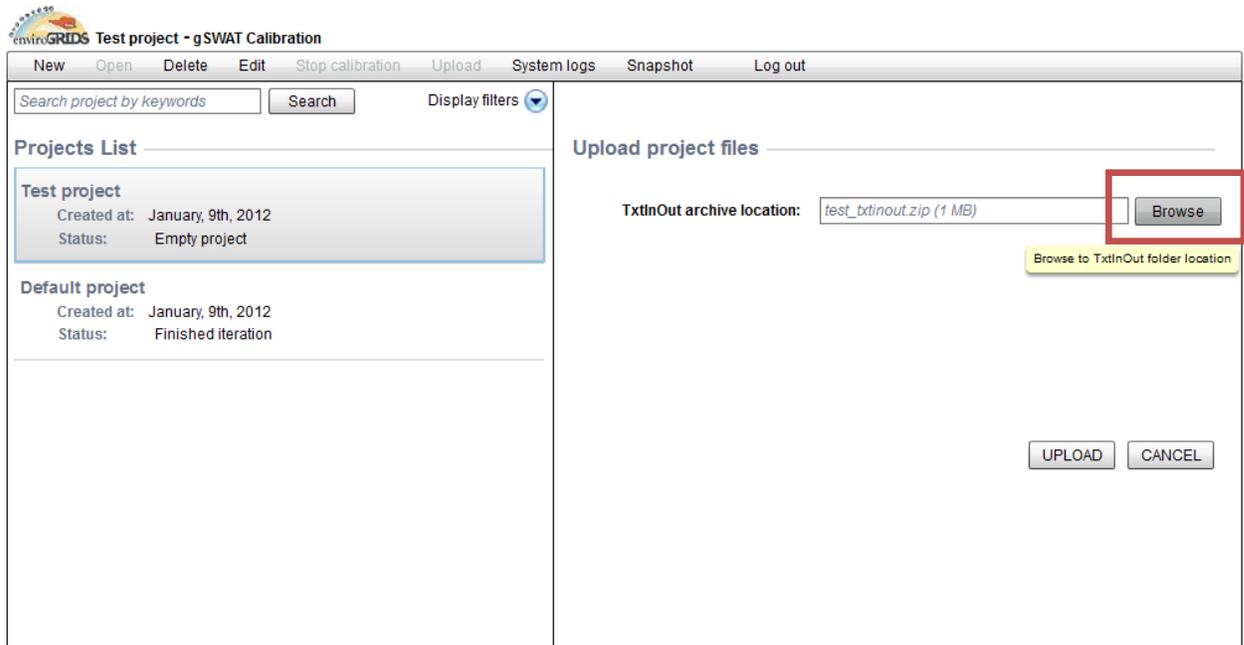

Figure 4. Create new project – step 2

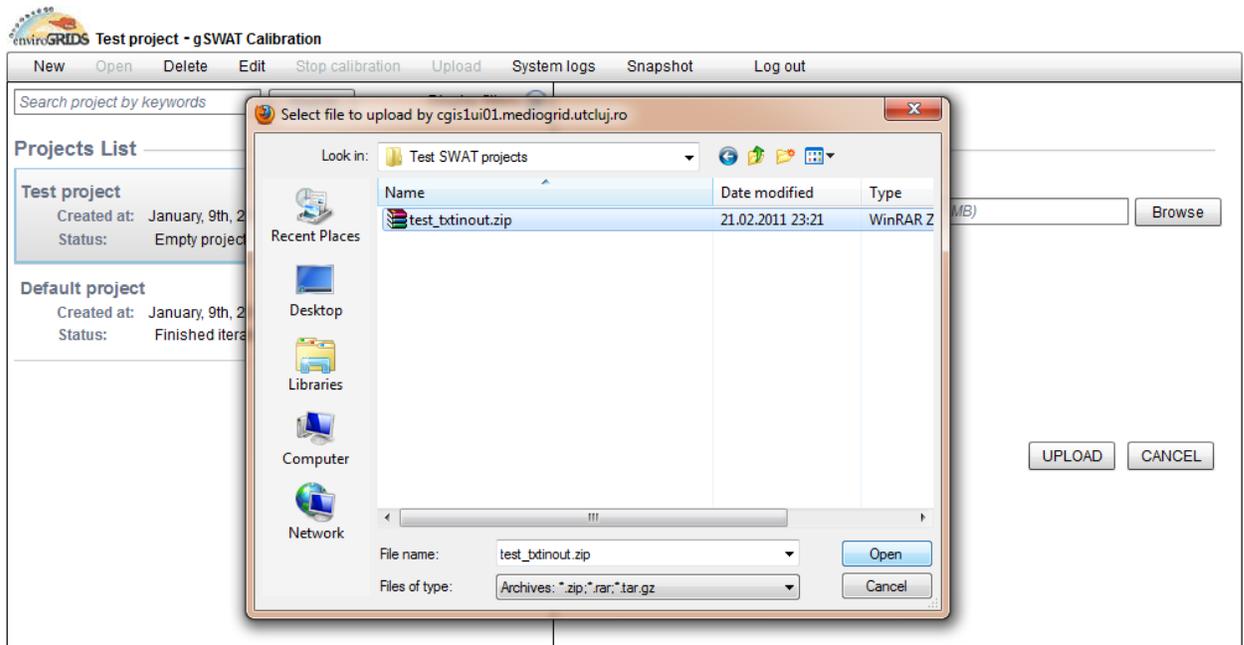**Figure 5. Create new project – step 3**
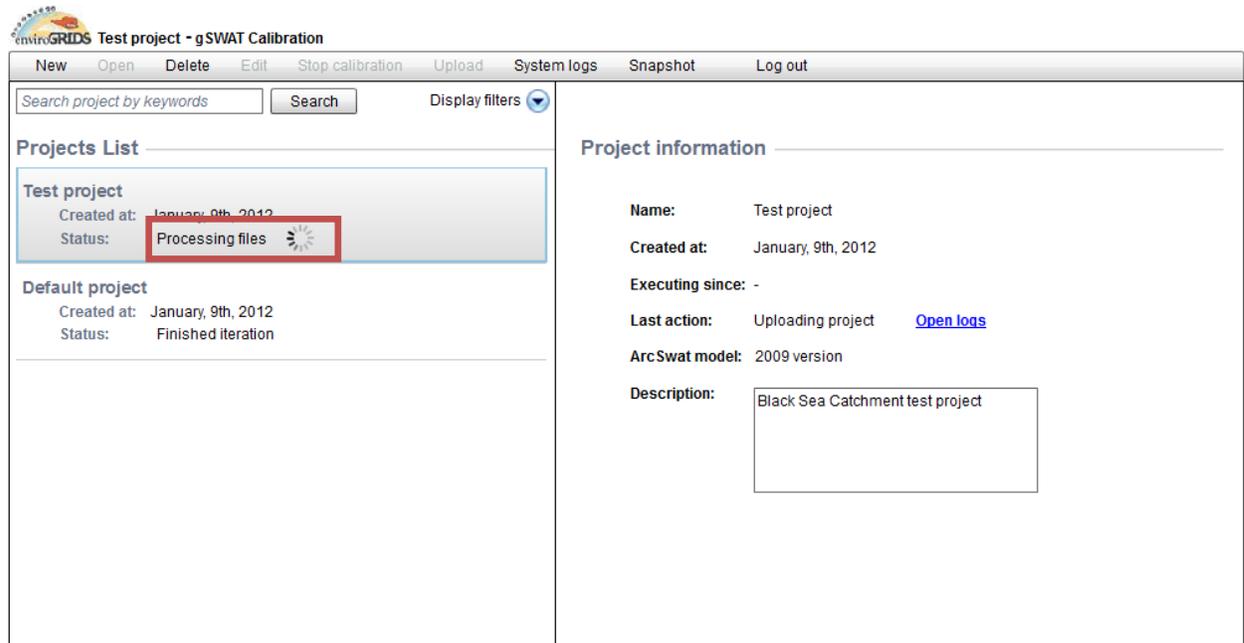

Figure 6. Create new project – step 4

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).
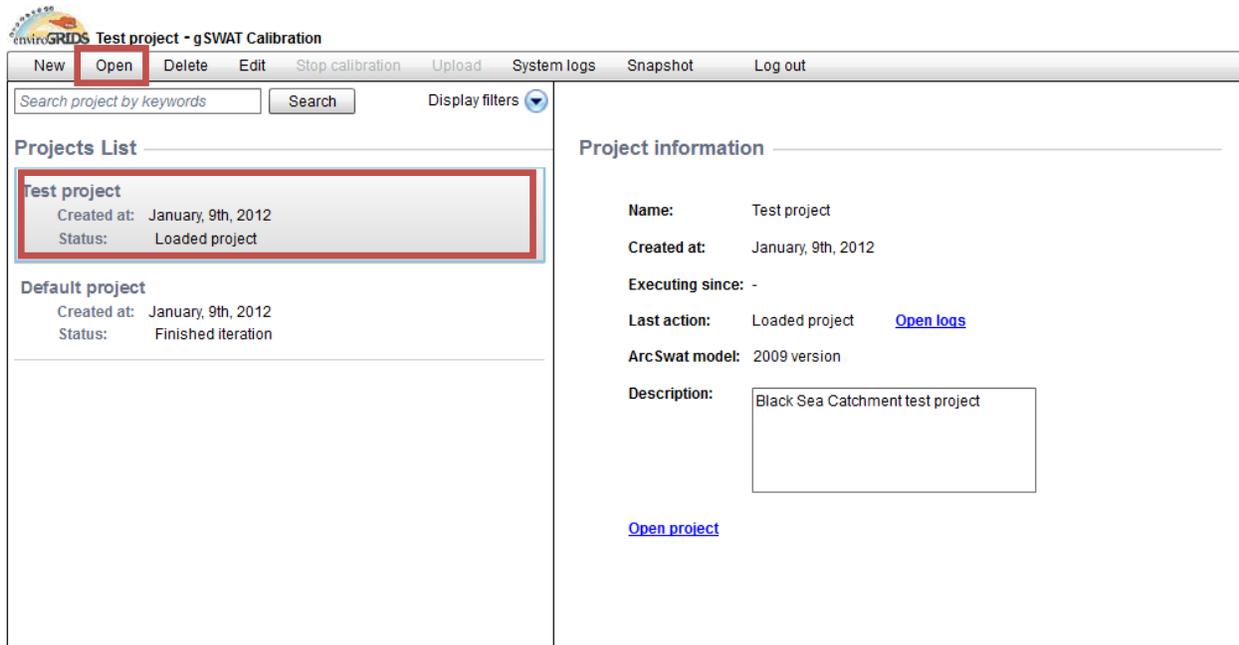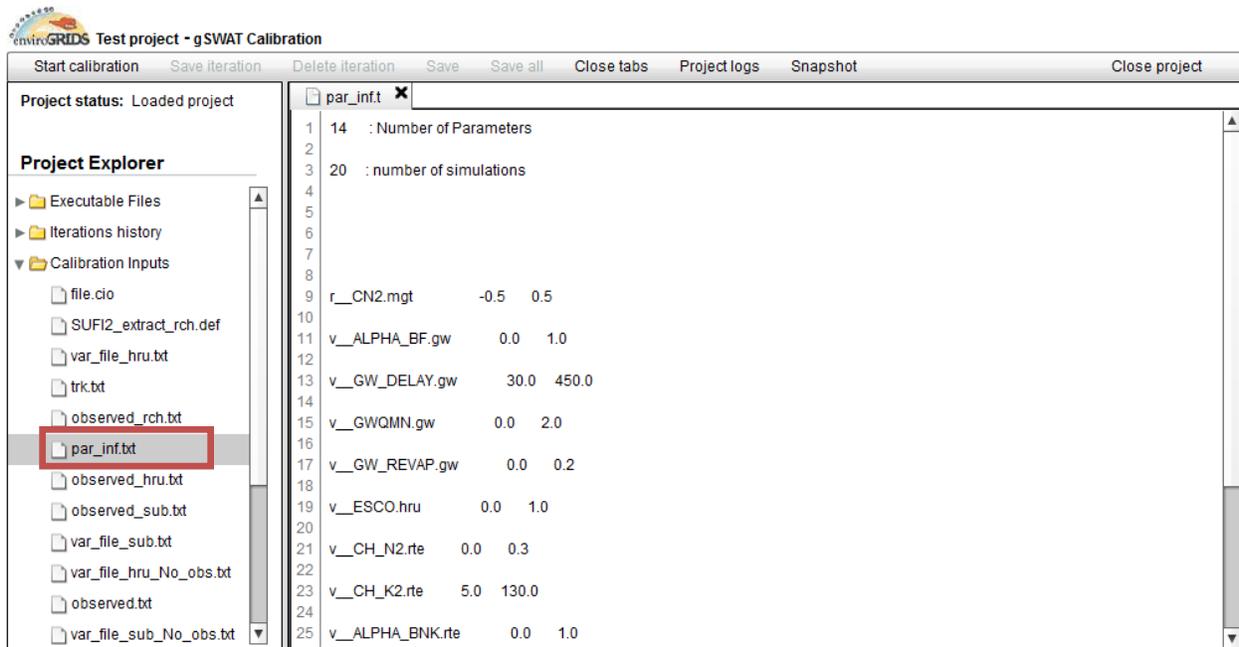
Figure 8. Calibration – step 1
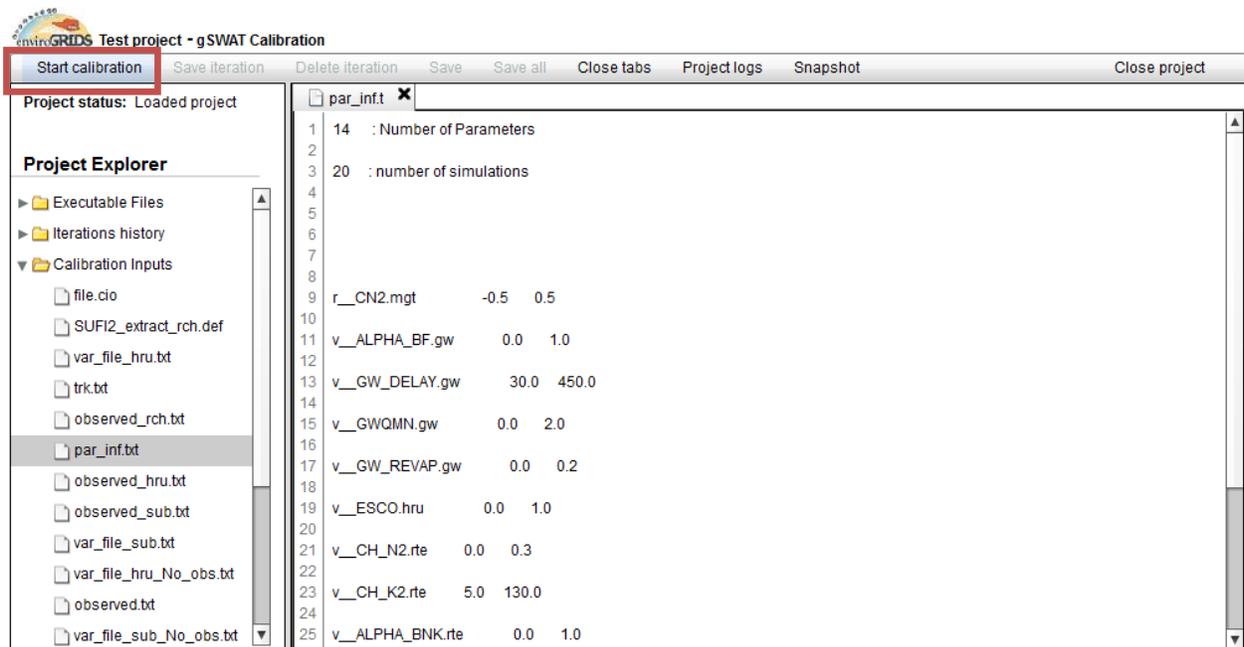

Figure 9. Calibration – step 2

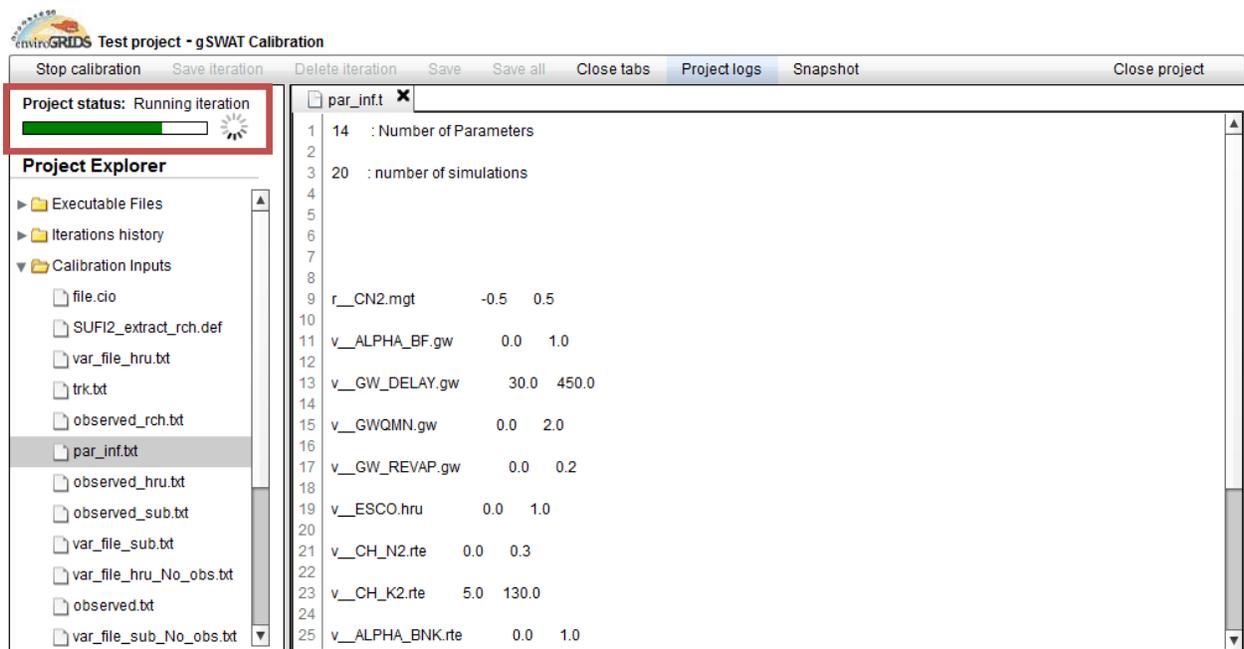**Figure 10. Calibration – step 3**

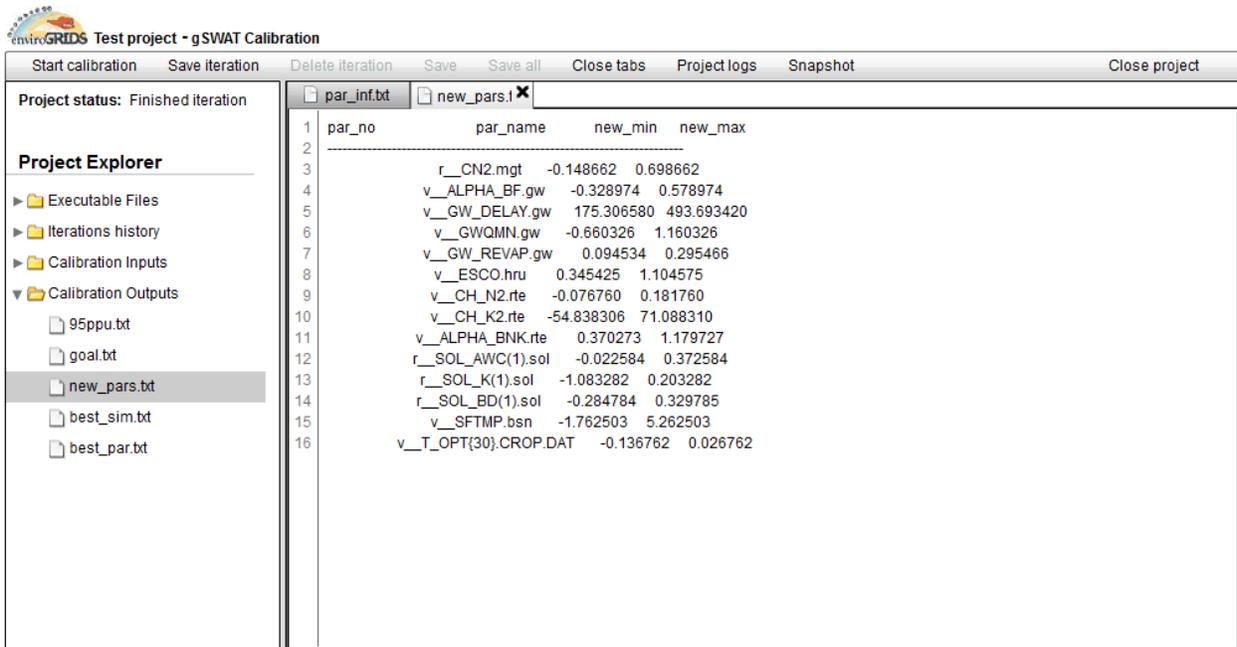**Figure 11. Calibration – step 4**

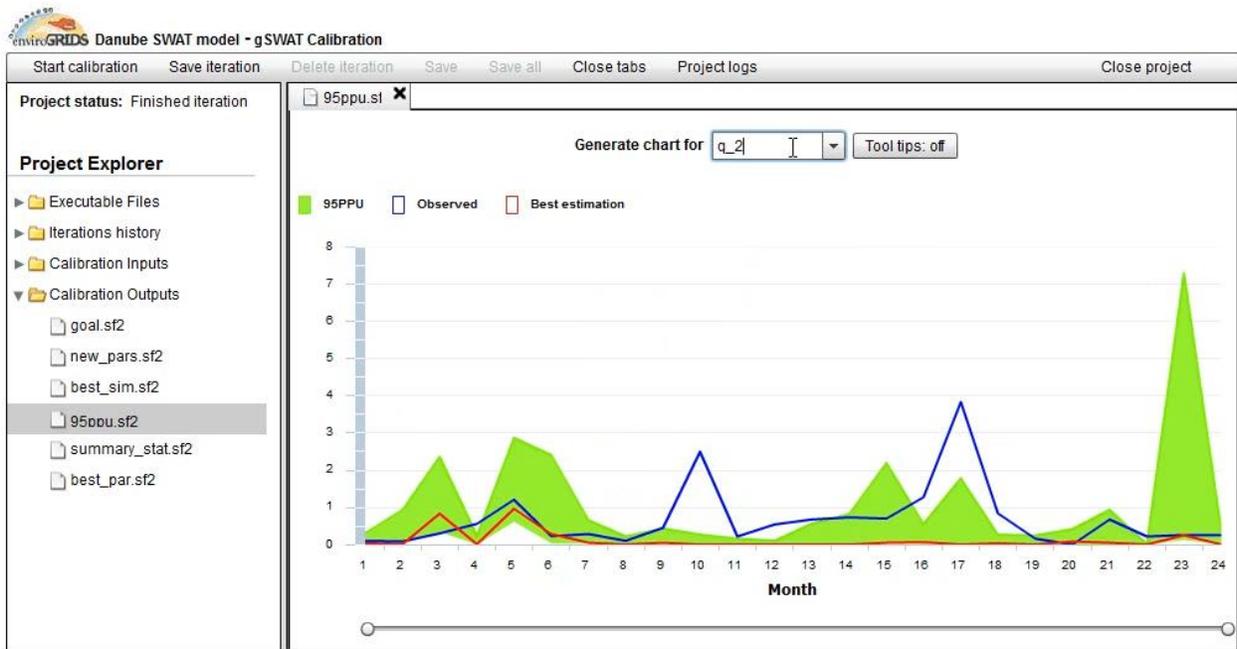**Figure 12. Calibration – step 5**

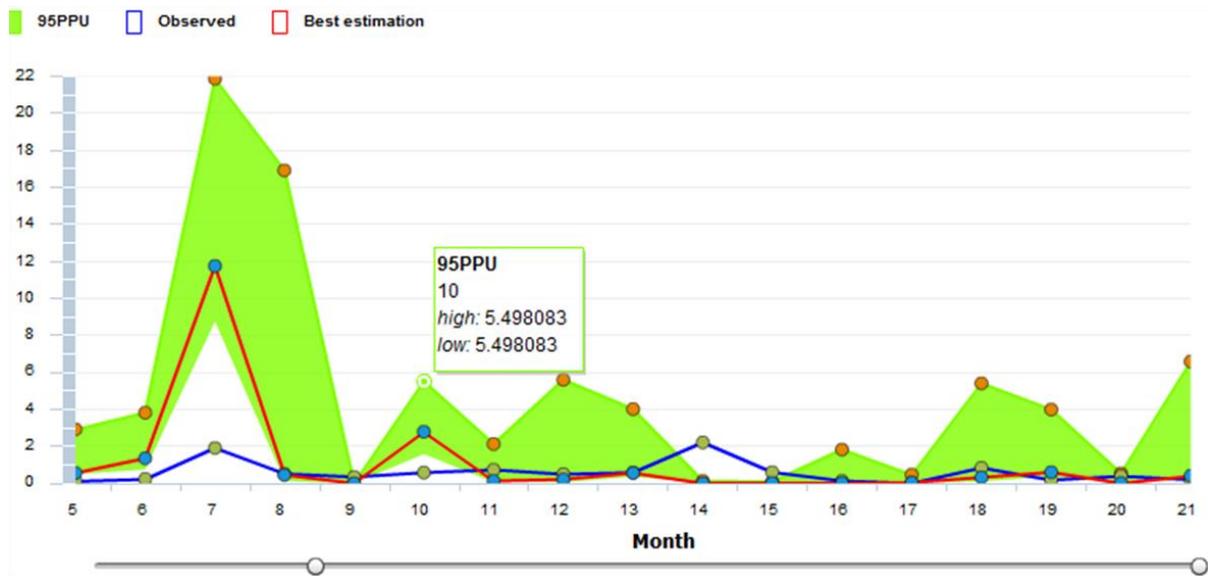

Figure 13. Calibration – step 6

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.