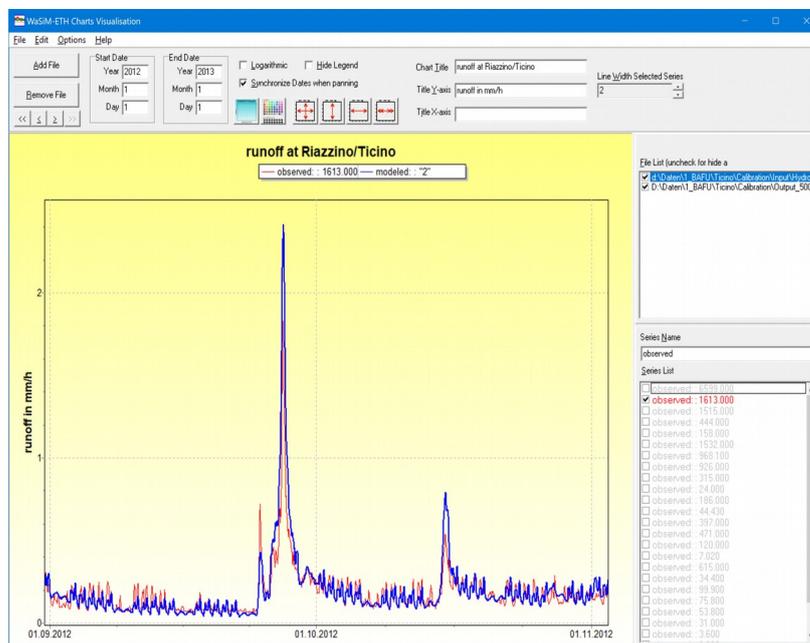


Graphlines-Documentation Version 1.4

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Contact: j.schulla@wasim.ch

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1 Introduction

Graphlines (gl.exe) is a help tool to visualize input and output time series data for the hydrologic model WaSiM-ETH.

The main features are:

- All WaSiM result files can be displayed in a chart. Result tables will automatically be parsed, each column is a separate series
- Titles of the columns in the result file are automatically used as titles for the single columns (usually sub basin specific results or specific entities of a reservoir etc.)
- The series name is automatically taken from the file header. This name can be changed manually
- As long as the hardware and operating system specific limits are not met, any number of files and series can be loaded and displayed
- Each loaded file can be switched on and off in the display separately
- Each column in a loaded file (i.e. sub basins, basin average etc) can be chosen separately to be displayed by a checkbox in front of the series name in a list box
- The selected series will automatically appear in a legend at the top of the chart. The legend contains the (customized) series name and the sub basin code and/or sub basin size
- If required, the legend can be hidden (e.g. when so many series are shown that the legend is no longer of any help)
- Result files in different temporal resolution can be displayed in a single chart without any specific set up. Thus, hourly and daily results can be compared easily.
- Each series gets its own color and line style assigned. There is a pre-defined color set, so depending on the order in which the series are checked to be displayed, the line color of the series is set
- By double-clicking on a series (either on the line graph itself or on the series list in the right panel), the color can be adjusted manually
- A series that is selected in the series list with the mouse or keyboard can be displayed in a thicker line style, depending on the „Line Width Selected Series“ value (right most control in the upper panel)
- **new in 1.4: Some speed buttons and shortcuts allow fast fitting to pre-defined x- and y-ranges**
- **new in 1.4: nodata values are suppressed, a gap appears in the series where nodata values are found (in former versions, the series continued to -9999, what looks quite annoying when time series with many missing values should be displayed)**
- The value range can be displayed in logarithmic scale (only if values are all greater than 0)
- A quite important feature: zooming in is possible by choosing a region with the mouse from the upper left edge to the lower right edge of the area to be zoomed in. Zooming out is also possible by moving the mouse with pressed left mouse button a short way to the left and up.
- Also, the zoomed selection can be moved with the mouse in any direction. Both operations are executed in real time and even animated, so the orientation is quite easy.
- **new in 1.4: The background can be configured to show any color gradient you wish. This gradient can be switched off easily to get a graph with pure white background**

- **new in 1.4: The actually loaded files and selected series, the axis names and titles and the selected value range will automatically be saved to a file called gl.ini. When starting the program with this file as command line parameter, the last session will be restored**
- Graphlines needs to be activated by a license, without license, the module can be started, but no series can be displayed at all.
- Demo licenses are available on request. A standard license can be issued as user and/or hardware dependent license (the ID file contains necessary information)

2 GUI-Elements

2.1 Basic overview



Figure 1: layout of the module graphlines

Graphlines (gl.exe) aims to be a tool that can help to analyze WaSiM results quickly without requiring complex user interactions. The required component TeeChart is an extremely advanced graphic tool offering a lot more functionality than used here – no other chart styles than line graphs and no other line styles than solid lines are allowed in graphlines.

The x-axis is always defined as a date-time axis. Each file is automatically displayed using the correct date and time scale, as long as the input file format is WaSiM compatible.

The „unique selling point“ compared to product unspecific packages is, that big amounts of data can be loaded quite fast and that the navigation with the mouse (zooming, moving around) is very easy. Almost no specific settings are required – simply put the name(s) of the files to be displayed in the command line and start the program. Or choose the required files in a file open dialog.

The example in figure 1 shows the comparison between the observed water table (red) of Lago Maggiore and the modeled water table in two differently parameterized model versions.

2.2 The Main Menu

2.2.1 File

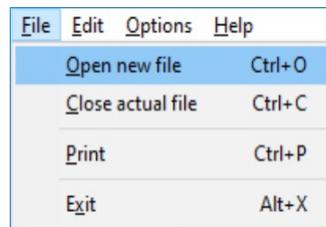


Figure 2: file menu

- Open new file, Ctrl+O

A file open dialog is displayed, allowing the selection of one or more files. All selected files will then be loaded. The last series of each file (which usually is the basin average of the respective entity) is automatically displayed in the chart.

Note: this command can also be started by clicking on



the button in the upper panel („rubber band“). Also, file names can be provided as command line parameters when starting the tool from a command line (like e.g. from TotalCommander)

- Close actual file, Ctrl+C

Deletes the selected file from the list of loaded files (and deletes all loaded series from the chart). Deletion only works if the selected file is the last in the file list

box. Note: the speed button  has the same effect.

- Print, Ctrl+P

Prints the actual chart to the standard printer, centered and in color.

- Exit, Alt+X

Closes the application

2.2.2 Edit

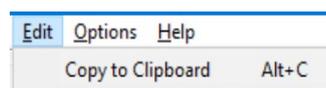


Figure 3: edit menu

- Copy to Clipboard, Ctrl+C

This command copies the Image as Windows Bitmap to the clipboard and can be pasted into other applications

2.2.3 Options

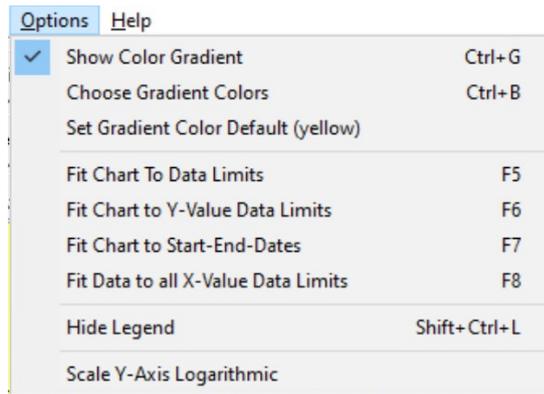


Figure 4: Options menu

- Show Color Gradient Ctrl+G Switched the background color gradient on or off
- Choose gradient colors, Ctrl+B Opens two color dialogs to choose upper and lower background color
- Set gradient color default (yellow) (no shortcut): resets custom background color to „factory default“
- Fit Chart to data limits; F5 fits the x- and y-axis to the min and max values of all actually displayed series (plus a small extra space on all four edges). Nice feature when loading new series and also when using the mouse to zoom in and move around to go back to the complete series as total viewpoint
- Fit Chart to To Y-Value Data Limits; F6 Fits only the y-axis, so the zooming in time is not reset
- Fit Chart to Start-End_Dates; F7 Fits x-axis to the start and end dates given in the dialog boxes in the upper panel („Rubber band“)
- Fit Data to all X-Value Data Limits; F8 Fits the x-axis to the entire series length of all displayed series, regardless of the content of the start and end date fields in the upper panel
- Hide Legend, Shift+Ctrl+L Hides or shows the legend
- Scale y-axis logarithmic (no shortcut but a speed button is available for this command): displays the char with a logarithmic y-axis. All displayed series must have all values > 0

2.2.4 Help

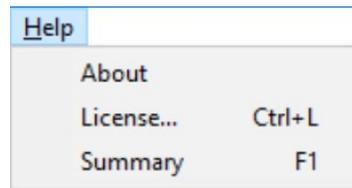


Figure 5: help menu

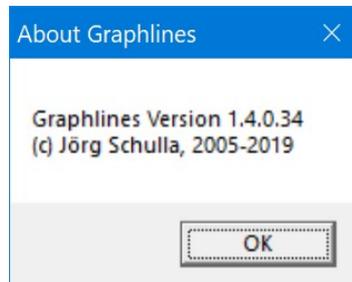


Figure 6: About box

- About: Shows a message box with version and copyright information
- Summary: If the PDF-file GL_Help_en.pdf is located in the installation directory of gl.exe and if a PDF viewer is registered on the computer (like Acrobat-Reader), then this file is opened. There is no other help implemented.
- License: When choosing this command, a dialog for managing licenses is opened. Here, licenses for Showgrid and Graphlines can be managed.

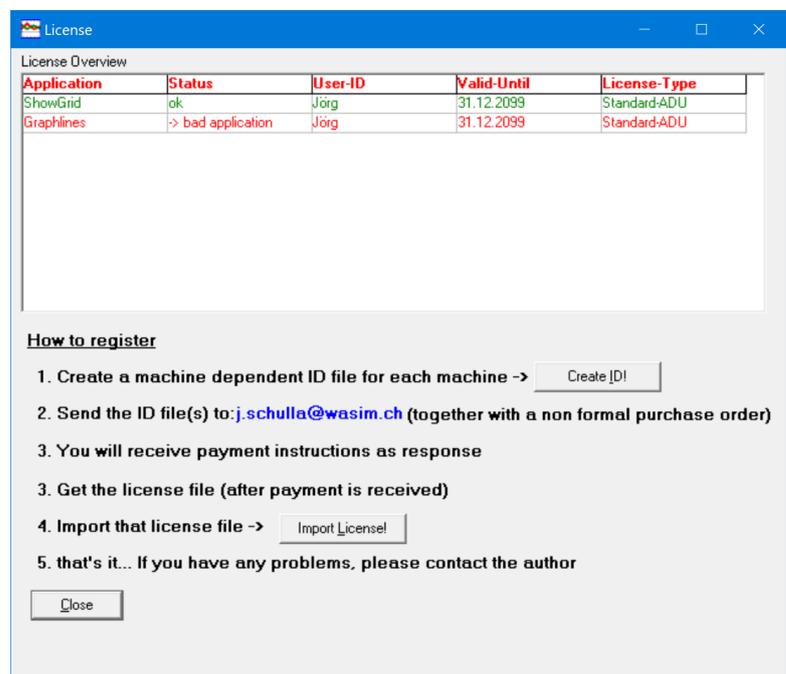
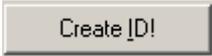


Figure 7: License window

• This dialog contains a step-by-step checklist, how to order and install a license. The following steps are required:

- Create an ID file. Use the button

A rectangular button with a light gray background and a thin border, containing the text "Create ID!" in a sans-serif font.

This command collects some hardware specific properties of the computer and saves the data as an ID file. Depending on the license agreement, the license can be issued for specific hardware, specific users and a specific time period or a combination thereof. Therefore it is important to create the ID file on the same computer where the tools should run and with the same user who will use the tools.

- Send the ID file(s) to the e-mail address given in step 2 and order the required licenses (please add billing information like your name, address, name of the organisation, zip-code, city etc.)

- The license will then be generated based on the ID file(s). You will receive the license via e-mail. The invoice will usually follow either by e-mail or on paper.

- The license file can then be imported by clicking on  and choosing the provided license file. The license window will then show all licenses and their validity.

Note: When starting Showgrid for the first time, the command „Load Grid“ is not available. A valid license (either a demo license or a standard license) is required. After installing the license, the program must be restarted.

2.3 The Control Panel

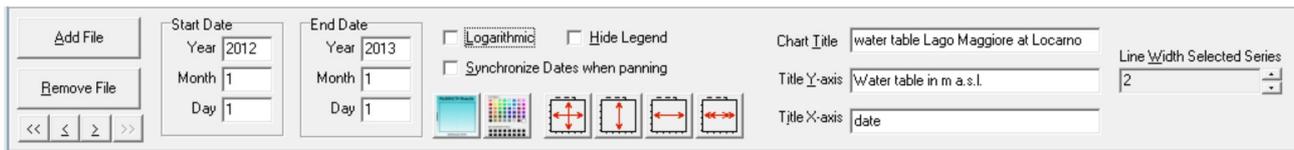


Figure 8: The control panel

2.3.1 Navigationsbuttons

The control panel contains a number of buttons, checkboxes, edit fields and other controls that allow fast access to almost all functions of the module.

Below the buttons „Add File“ and „Remove File“ There are four navigation buttons:

- „<<“ jumps to the beginning of all read in time series. The actual zoom factor and the y-scaling will be kept
- „<“ „Page left“, i.e. jumping one page to the past, keeping zoom factor and y-scaling constant
- „>“ „Page right“, i.e. jumping one page to the future, keeping zoom factor and y-scaling constant
- „>>“ not available yet in the actual release.

2.3.2 Start- and End date-columns

Using the six edit fields for start and end date, the visible x-axis range can be selected (year, month and day must be put into the respective fields which are pre-populated with the values read from the last read file.

2.3.3 Chart- and Axis titles

The edit field „Chart Title“ allows to set a main title on the chart. The default is „WaSi-ETH Results“. Changes will be immediately shown on the chart.

The edit fields „Title Y-axis“ and „Title X-axis“ can be used to assign titles to the respective axes. If no titles are required, the values can simply be deleted.

2.3.4 Other settings

- Logarithmic If checked, the y-axis is scaled logarithmically. No selected series is allowed with negative or zero values, since logarithmic scaling is not possible for values ≤ 0 .
- Line Width Selected Series The selected series is shown in a slightly thicker line style. This control allows the definition of the line width of the selected series.
Note: If multiple series should be displayed in a thicker line style, this can be achieved by selecting the series in the series list box with the mouse and then selecting another file directly in the file list with the mouse. Then, the series in the newly selected file must be selected with the mouse

2.4 File- and Series lists boxes

2.4.1 File list box



Figure 9: file list box

The file list box lists the names of the files that were used as command line parameters or opened by using the „Add File“ button or the „File“ → „Open new File“ menu item. A file that is not in WaSiM table format or contains no data will cause an error message to be displayed when trying to load it. Such files will not be displayed in the list of available files.

By clicking on the leading checkbox before a file name, all series of that file can be removed from the chart (only from the display, they are still loaded).



Figure 10: Assigning series names

Below the file list box, an edit field allows the definition of a series header which is valid for all series of the selected file. This name is post fixed in the legend by the sub basin code or the string „tot_average“ (depending on what appears in the column headers in the WaSiM statistic file). Thus, each series of each file has a specific name in the legend.

2.4.2 Series list

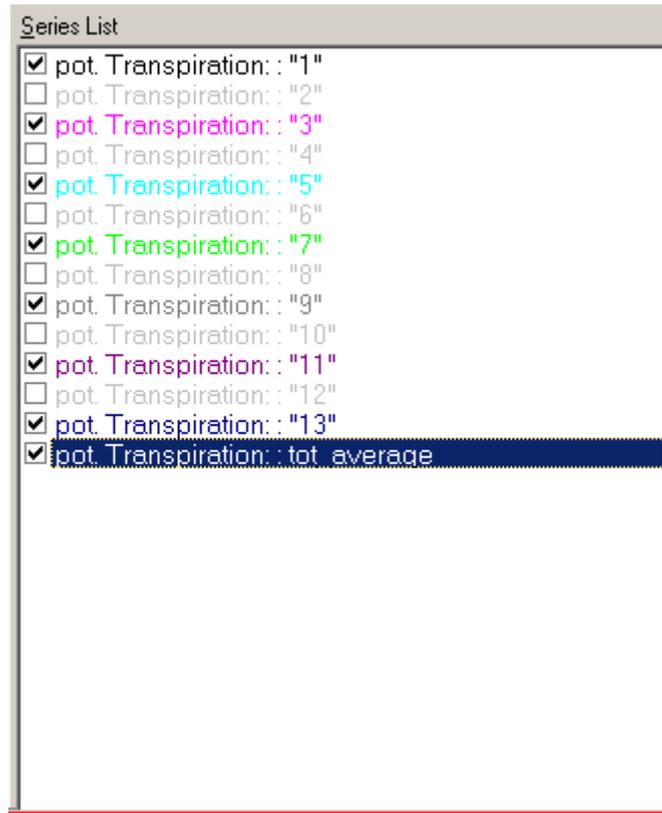


Figure 11: series list

This list box allows the separate selection of any time series of the file selected in the file list box. Here, one can choose, which series should be displayed, e.g. runoff from which sub basin should be displayed together with observed runoff etc.

The codes after the series names is taken from the WaSiM statistic file header which describes the sub basin code. The last column usually contains the total average for the entire basin, so the code is „tot_average“.

When double clicking on the series name, a color dialog opens and a color can be chosen for the selected series.

3 Workgin with graphlines

Working with graphlines is quite intuitive: After loading one or more files and selecting the series to be displayed, the chart can be zoomed in and out by using the mouse. Also, the visible area can be moved with the mouse . The chart will move and zoom in an animated style if possible.

Zooming out can be achieved by defining a rectangle with the mouse somewhere in the chart from lower right to upper left. This is equivalent with pressing F5, the y-axis and the x-axis will be scaled automatically to fit the data and the time range defined in the date and time edit boxes in the upper panel.

If the series are already zoomed in, the visible part can be moved by clicking with the right mouse button in the chart and moving the mouse. Moving to the orevious or next time span can also be echieved by using the navigation buttons in the upper panel: „<<“, „<“ and „>“. The buttons with „<“ und „>“ can also be called by using keyboard short cuts Alt+„<“ or Alt+„>“.

New in version 1.4: nodata values are supressed completely. If a series contains nodata values, the series is simply not drawn there.

A last tip: Zooming out not to the full extend can be achieved like this: Start zooming in the upper left corner and drag the mouse far beyond the right and/or lower border of the chart (of course it is necessary to have graphlines not maximized on your screen). The chart is then zoomed out to the extend that was defined with the mouse, even if the mouse was outside the chart.

4 Technische Informationen

5.1 DLLs and other binaries

The following dlls (files with extension dll are „dynamic link libraries“, i.e. files that contain executable code, which can be used by several programs simultaneously and which are loaded at runtime) and other libraries are used by gl.exe:

- borlndmm.dll
- cc3260mt.dll
- vcl60.bpl
- vcl60.bpl
- tee60.bpl
- rtl60.de

These files will be copied by the setup tool to the installation directory.

5.2 Operating system environment

Graphlines was developed on Windows XP, Windows 7 and Windows 10 and should be able to run on Windows 10 now. If installed with an Admin account, the program should be accessible by all normal users. For installing the module and for installing the license file, Admin permissions are required. The license file will be written to the registry, on Windows 10 it will be copied to c:\ProgramData\WaSiM-Tools\licence.txt

If licenses are not correctly recognized by the module, it may help to delete the key HASH under Computer\HKEY_LOCAL_MACHINE\SOFTWARE\WOW6432Node\Wasim-Tools\License

5.3 Notes for using Graphlines under Linux

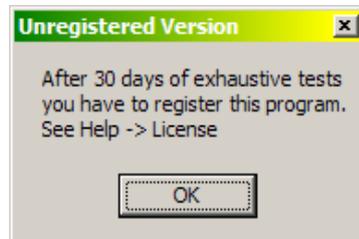
If a package like wine is installed, Showgrid can also be used under Linux. Call the program like this:

```
wine gl.exe <wasim-table file> [<wasim-table file> [...]]
```

The required license may differ from a windows license, even if running on the same computer. Please contact the author in such cases.

6 Licensing

Graphlines is offered as shareware. The user may download and install the software and request a demo license that is valid for a test period of usually 30 days. After this testing period, a registration and licensing is required. The demo/Shareware-Version shows a splash-screen on startup, identifying the version as unlicensed test version:



In Demo mode, some functions are not available:

- no command line parameters can be passed to the program .

A fully licensed version is usually licensed per machine or per user. A machine specific license can be used by any user on that machine, while a user specific license can be used by that user on different machines, as long as only one copy is used at a time.

If multiple licenses are purchased, then no more users than the number of licensed copies may work at the same time with the module.

License types are:

- Demo license: A short term license with the above mentioned restrictions, usually for a 30-day testing period
- Standard license: License with a valid-until-date of 31st of December 2099. This type of license is always restricted to a specific hardware and/or to a specific user (login name). For specific scenarios, other options are possible (e.g. no hardware and user limitations but a runtime limitation for one year for pool licenses)
- Example: Standard-ADHU
 - A = Application (valid for showgrid or graphlines)
 - D = date (valid-until-date as dd.mm.jjjj or mm/dd/yyyy, depending on the language settings)
 - H = hardware dependend (a hardware specific key will be checked on startup)
 - U = user specific license

The features can be mixed in any combination. Usual license types are: Demo-AD oder Standard-AH oder Standard-AD.

To order a license, please send the ID file together with your order to j.schulla@wasim.ch

The prices are subject to change. Prices in Swiss Francs are listed in the following table (for other currencies than Swiss Francs these are guiding values only, the effective prices depend on the daily exchange rates and additional transfer fees):

<i>1st license</i>	<i>2nd -10th . License</i>	<i>11th license and more</i>
80 CHF	65 CHF per license	50 CHF per license