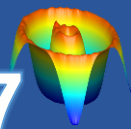# Info to *SimplexNumerica*

GPX Module[1]

What is GPX?

GPX is the abbreviation for GPS Exchange Format, a file format for the exchange and archiving of GPS data. Waypoints, routes and tracks can be saved in a *.gpx file (e.g.: `Camino del Norte.gpx`).

What are the advantages of GPX?

GPX is based on XML and is therefore an open format that can be used by anyone. Every modern GPS software supports GPX, i.e. the file can be opened/imported, modified and saved/exported.

For newer GPS devices (like Garmin Oregon, Montana, Dakota), it is possible to save (export) *.gpx files directly (without GPS Software) to that device. You can also import files from there to the *Explorer* or *SimplexNumerica*. The GPS device is recognized as an external memory: like the Garmin folder > GPX.

Google Earth

In *Google Earth* you can import a *.gpx file via

→ File > open > Filetype: GPS (*.gpx)

Unfortunately, saving as *.gpx is not possible inside *Google Earth*. Luckily, for this purpose there is now the GPX Module inside *SimplexNumerica* where *.gpx data can be imported, edited and exported.

Here again the procedure in *Google Earth*:

1. Open *Google Earth* and select "File -> Open" from the menu
2. In the drop-down menu of the dialog box, select the GPX file format (*.gpx) and choose the file you want to open.
3. In the following window "GPS Data Import" activate the preferred options and click Ok.

GPX Module in *SimplexNumerica*

Of course, *SimplexNumerica* cannot be an all-encompassing all-round reference for GPS data. But it implements all the functionality the author of *SimplexNumerica* missed on his mountain bike tours by his Garmin Edge Explorer and other external editing tools 😊

With the GPX module in *SimplexNumerica* you can easily change (edit) tracks, routes and waypoints recorded e.g. with a GPS receiver. The data must be available as GPX file to import them. The map display of OpenStreetMap (OSM) is used to display the data.

---

[1] Based on PJ Naughters work on *COSMCtrl*, A freeware MFC GUI control class which implements display of OpenStreetMap tiles. Here is his website: http://www.naughter.com

GPX Module

Building waypoints, routes and tracks

The simplest form of a .gpx file is a waypoint, which contains name, symbol, geographical latitude and longitude. In addition, details such as altitude, description, link or time are possible. The coordinates are stored relative to the WGS84 date.

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<gpx xmlns="http://www.topografix.com/GPX/1/1" creator="SimplexNumerica -
http://www.SimplexNumerica.com"
version="1.1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.topografix.com/GPX/1/1
http://www.topografix.com/GPX/1/1/gpx.xsd">
   <wpt lat="28.940408" lon="2.405832">
     <name>My Home</name>
     <sym>Flag, Red</sym>
   </wpt>
</gpx>
```

➔ *Routes are a sequence of waypoints.*

Tracks consist of track segments, which in turn consist of points/coordinates.

If these points contain elevation data (ele), it is possible to create an elevation profile using GPS software. If a time information exists for each point, the *.gpx track can be used to locate photos. In the track analysis, this also brings the speed into play.

```
<trkpt lat="49.3559986" lon="7.7518555">
 <ele>298.1461182</ele>
 <time>2008-10-26T10:34:01Z</time>
</trkpt>
<trkpt lat="49.3559851" lon="7.7519757">
 <ele>301.0299072</ele>
 <time>2008-10-26T10:34:12Z</time>
</trkpt>
<trkpt lat="49.3559369" lon="7.7520756">
 <ele>304.3946533</ele>
 <time>2008-10-26T10:34:24Z</time>
</trkpt>
<trkpt lat="49.3558494" lon="7.7522226">
 <ele>307.7592773</ele>
 <time>2008-10-26T10:34:43Z</time>
</trkpt>
```
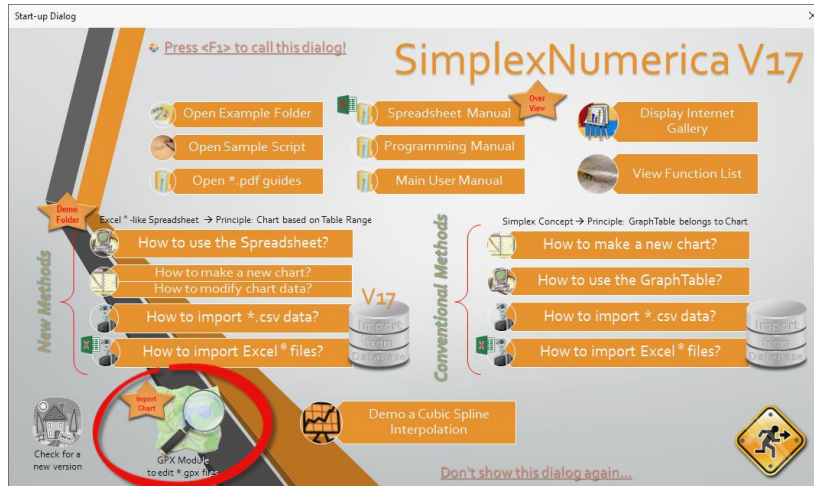
See here: https://de.wikipedia.org/wiki/GPS_Exchange_Format

GPX Module

Entry into the GPX Module

The easiest way to get into the GPX Module is with the help of the startup dialog that appears every time at the beginning (unless you have banned it). It can also be called up again with the key <F1> if necessary.
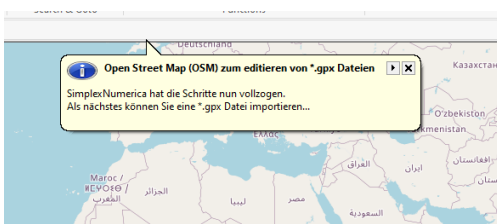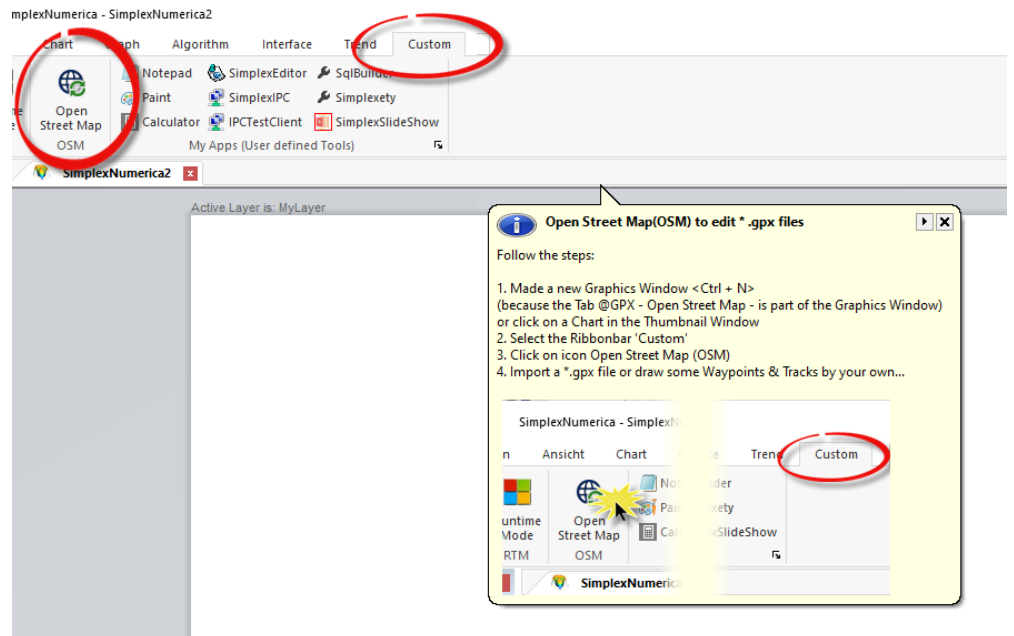

For the GPX module you will find a symbol in the left corner of the dialog and a star banner above it. Both can be clicked and lead to different adaptations.


→ Now please click on the magnifying glass symbol with the map section below.

This leads to a call of a sequence of so-called balloon tips. In the first tip the steps are enumerated…


You can end the balloon tip here or click on the arrow button at the top right to move on to the next tip (after you have read the text).

After *SimplexNumerica* has completed the steps automatically, we get to the Fileselectbox for selecting a *.gpx file. *SimplexNumerica* suggests a file the first time it is used (this file is located in the installation folder …\Tutorial\GPX)

GPX Module
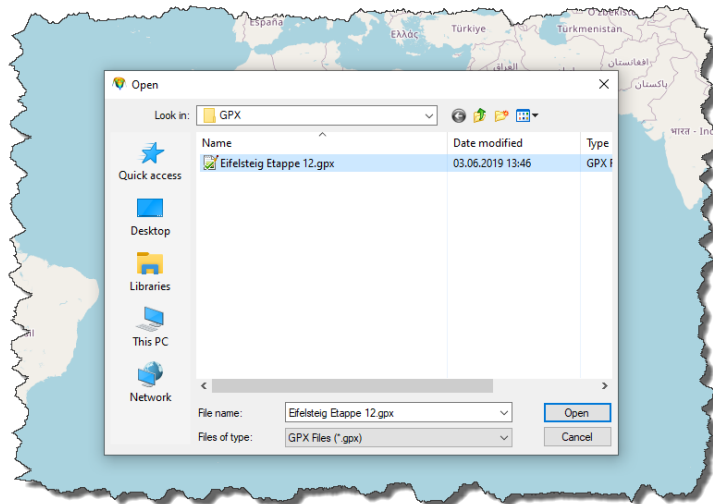
Please select the file and you will get to the…
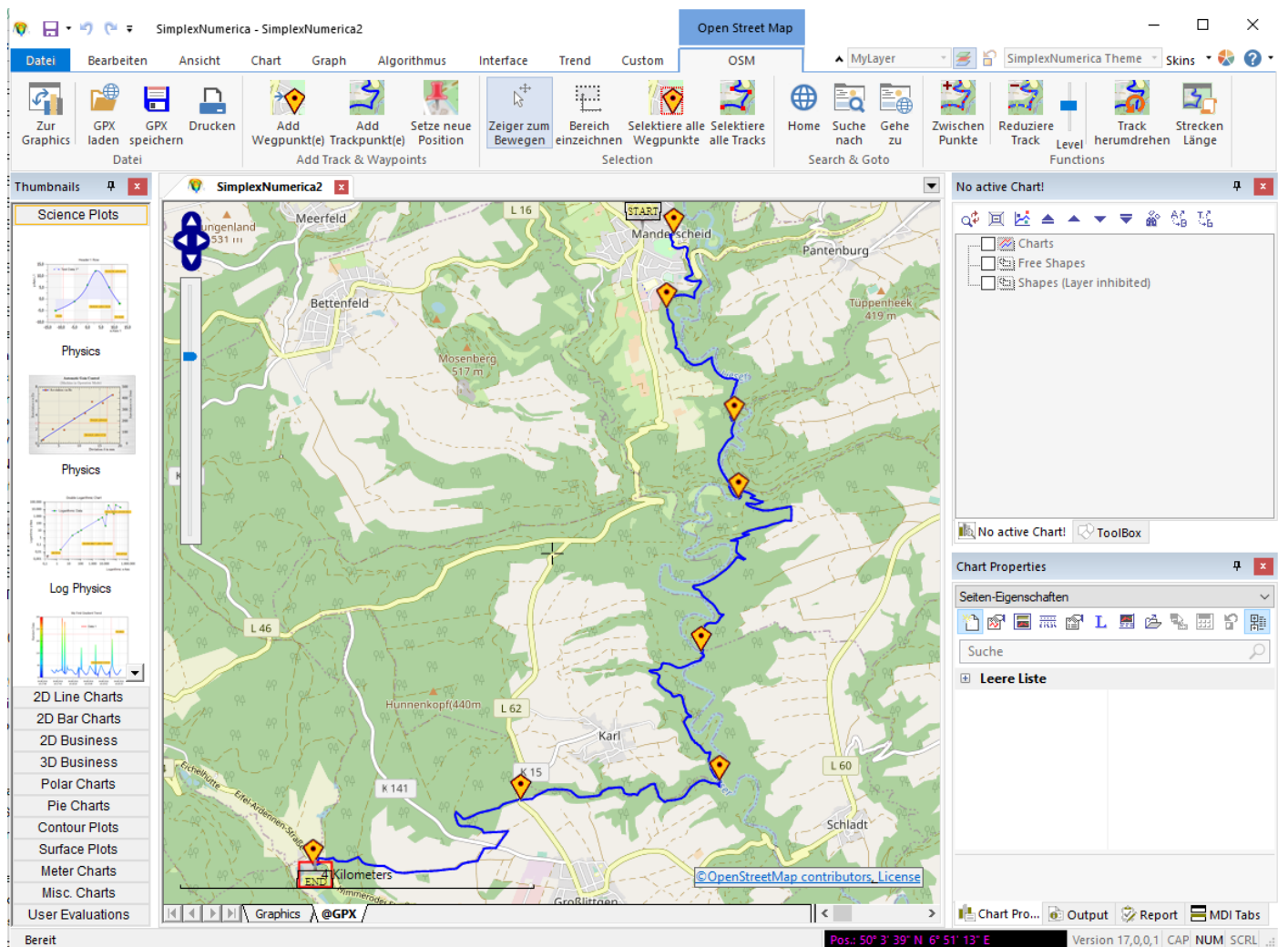
<div align="right">…GPX Module from SimplexNumerica</div>

GPX Module

Import *.gpx File in a Chart

Files in *.gpx format can also be imported in the Graphics Window as SampleData for charts. The GPX Module is then automatically run through.

Also, with this application we want to start from the startup dialog. Otherwise you would first select (click) a chart in the thumbnail window and then choose Import GPX File (*.gpx) in the ribbon bar <File>.
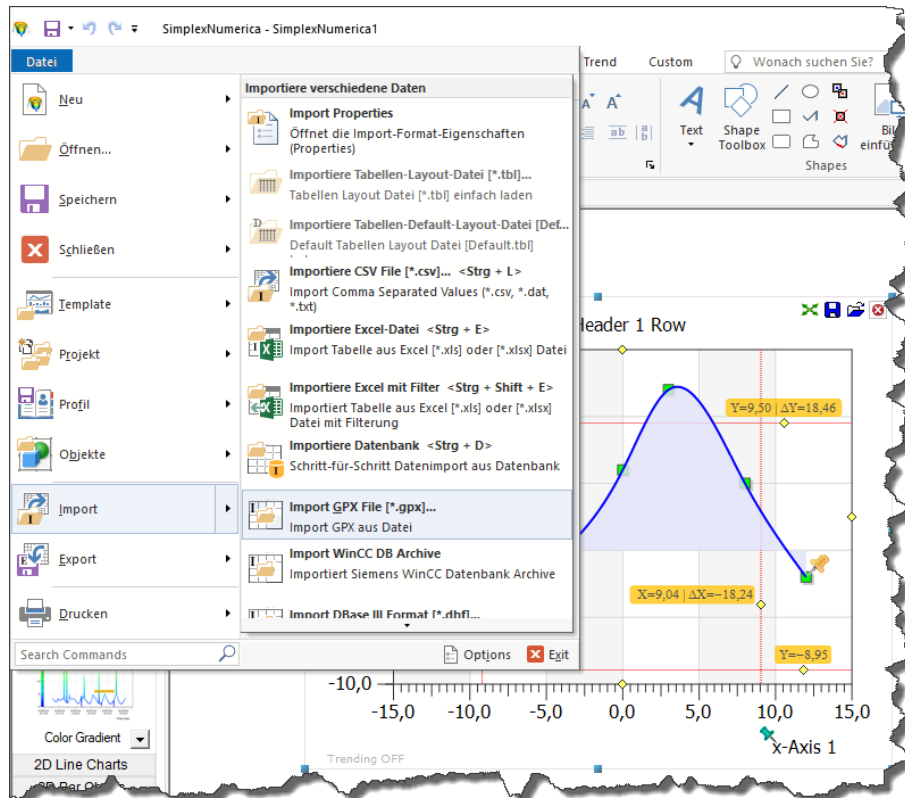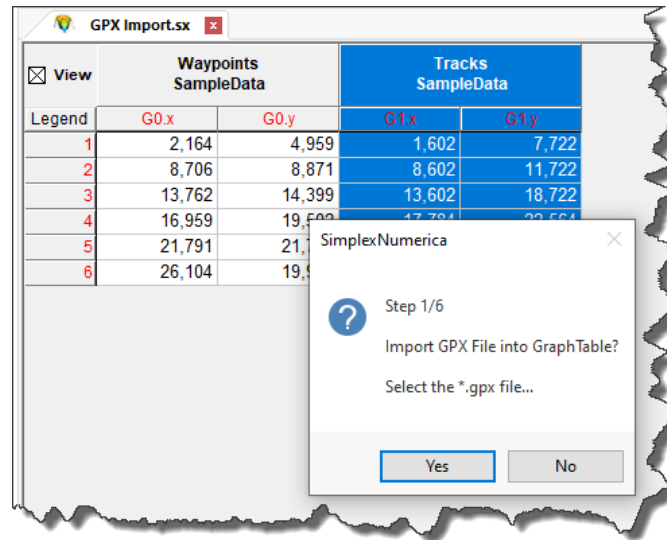

But now let's call the startup dialog with the key <F1>.
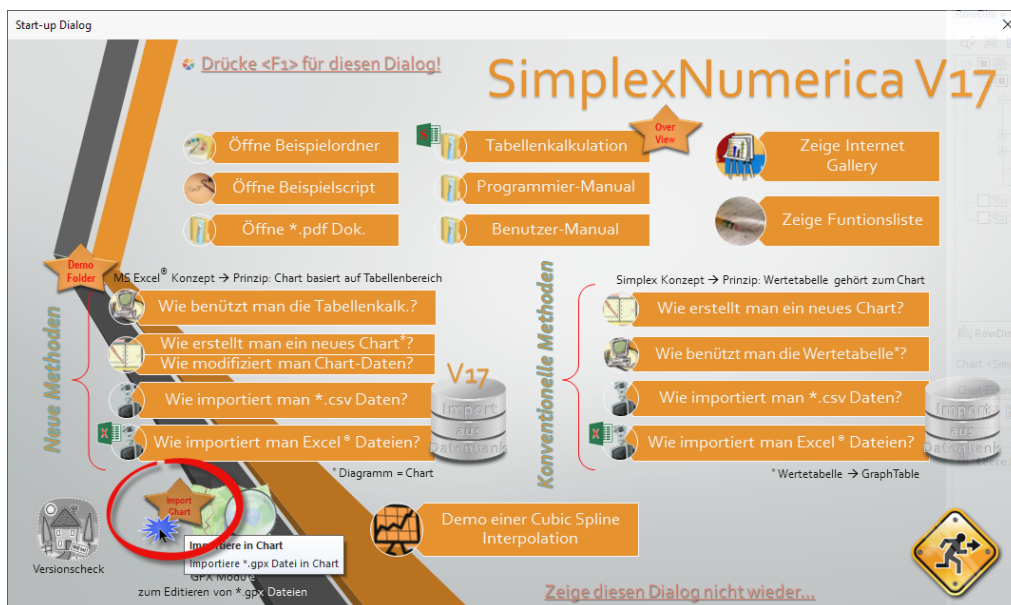
And click on the star banner named Import Chart .

GPX Module

The program then automatically calls up a Physics Chart and goes directly to the corresponding GraphTable. An alert box with step no. 1 pops up.
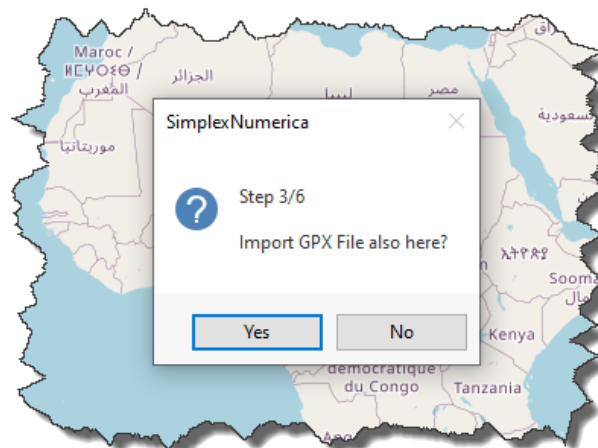

Now please select a *.gpx file in the following Fileselectbox. By the way, the first time you start the program, the file `"Eifelsteig Etappe 12.gpx"` from the tutorials folder will be suggested by the program. Please select this file…
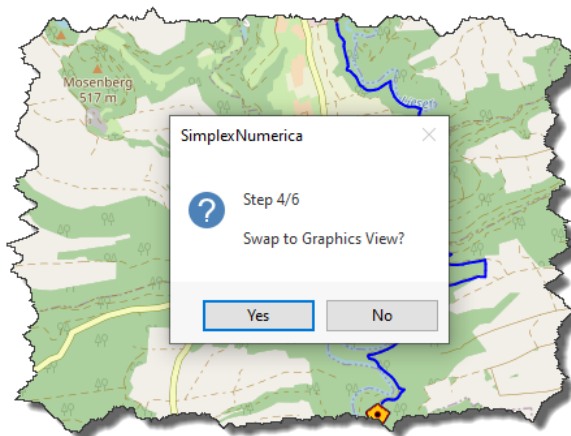
The next step is step no. 2
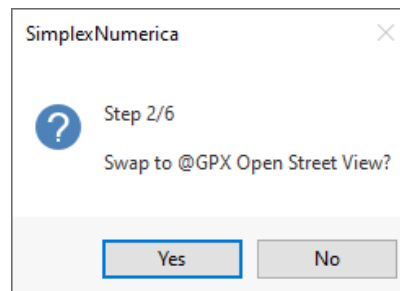
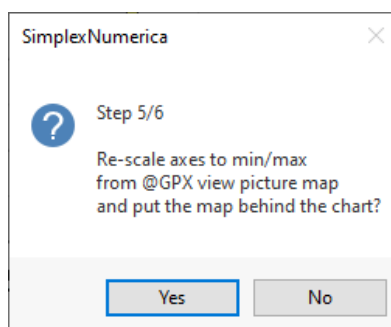The program asks you whether it should go to the Open Street Map (OSM) view. Yes, please…

Step 3 asks you if you want to import the *.gpx file that you have just selected. Yes please…
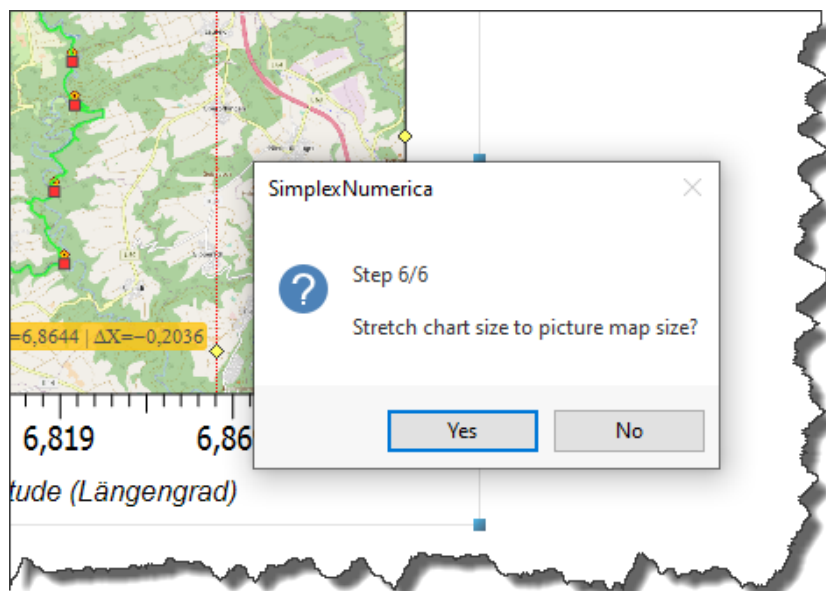
GPX Module

Do you want to switch back to the Graphics View will be asking step 4?

To adjust the axes of the coordinate system to the map section is the next step 5. Yes please...
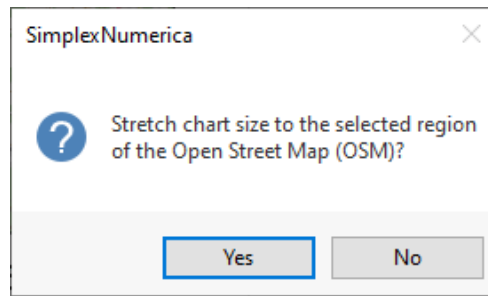

...then the last step 6 (of a total of six steps) takes place.

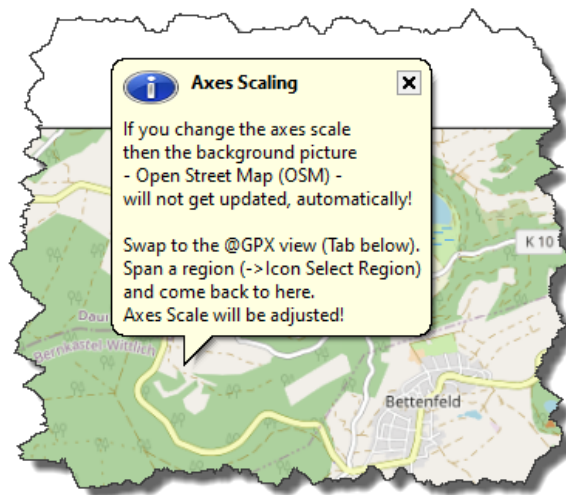...the adjustment of chart dimensions to the new map section. Done!

The message appears twice the first time because the program cannot know at this point that you have gone through a sequence of steps to get here...
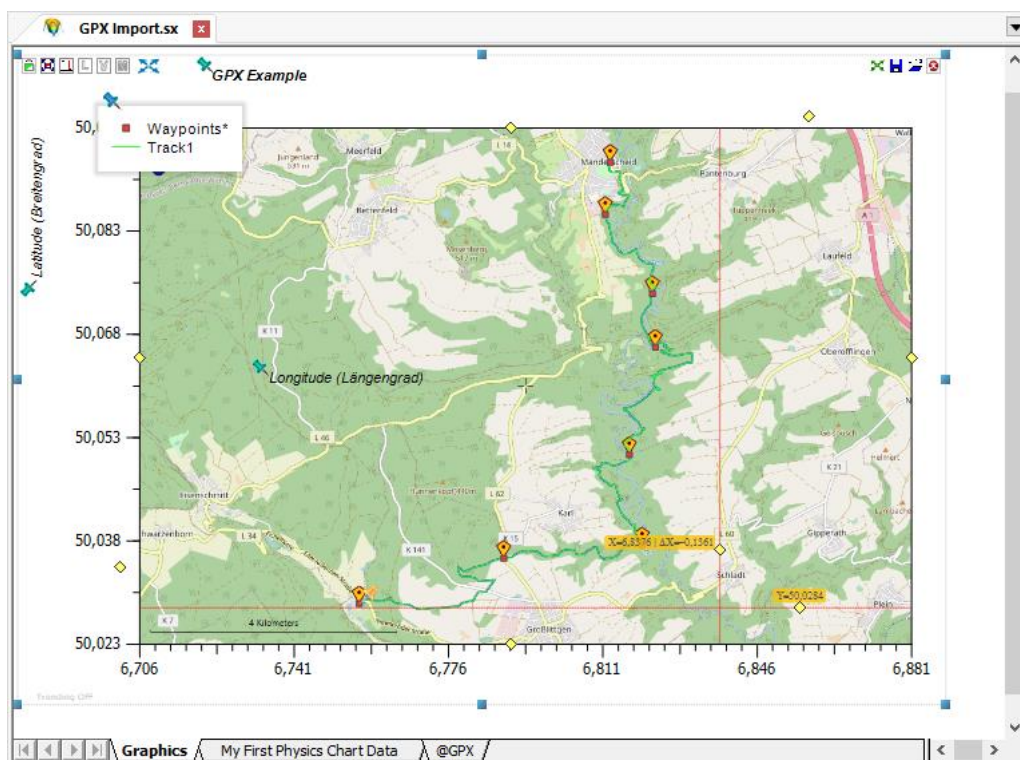
GPX Module

→ Next time this alert box will not appear again!
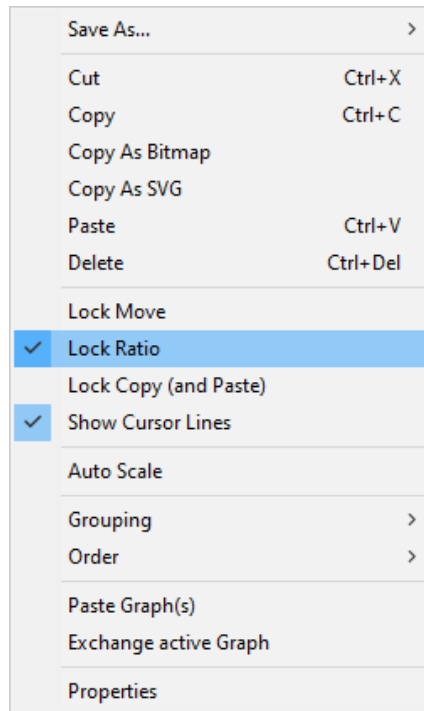
The following note also appears:

If you like, then try this out on your own.

GPX Module

If the chart has now become too large, please reduce it at the blue frame edges of the selected rectangle. The proportions of the background image (the map section) will be retained, as the program has switched to Keep Aspect Ratio (info: use right mouse button to call up the popup menu).

Save As...		>
Cut	Ctrl+X	
Copy	Ctrl+C	
Copy As Bitmap		
Copy As SVG		
Paste	Ctrl+V	
Delete	Ctrl+Del	
Lock Move		
✓ Lock Ratio		
Lock Copy (and Paste)		
✓ Show Cursor Lines		
Auto Scale		
Grouping		>
Order		>
Paste Graph(s)		
Exchange active Graph		
Properties		

Please switch to the GraphTable (key <F3>) to view and process the data (waypoints and tracks).

GPX Import.sx ☒

☒ View

| Legend	Waypoints SampleData			Track1 SampleData		
	G0.x	G0.y	G0.z	G1.x	*G1.y*	G1.z
1	6,812704	50,092871	373,000000	6,812704	50,092871	373,000000
2	6,811574	50,085337	333,000000	6,812107	50,092818	372,000000
3	6,822259	50,073866	308,000000	6,812150	50,092606	372,000000
4	6,822928	50,066108	273,000000	6,812219	50,092412	371,000000
5	6,817023	50,050561	230,000000	6,812383	50,092196	371,000000
6	6,819930	50,037489	224,000000	6,812576	50,092026	370,000000
7	6,788526	50,035563	310,000000	6,812469	50,091936	369,000000
8	6,755750	50,028976	200,000000	6,812447	50,091819	369,000000
9	~	~	~	6,812440	50,091689	368,000000
10	~	~	~	6,812662	50,091599	368,000000
11	~	~	~	6,812942	50,091491	367,000000
12	~	~	~	6,813278	50,091428	364,000000
13	~	~	~	6,813522	50,091437	362,000000
14	~	~	~	6,813765	50,091469	359,000000
15	~	~	~	6,814059	50,091523	357,000000
16	~	~	~	6,814446	50,091617	354,000000
17	~	~	~	6,814718	50,091514	351,000000
18	~	~	~	6,814811	50,091469	349,000000
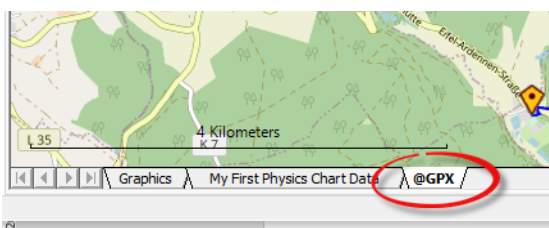
Changing (editing) waypoints and tracks graphically is best done in the Open Street Map (OSM), which is hidden behind the @GPX tab.

Graphics | My First Physics Chart Data | @GPX

GPX Module
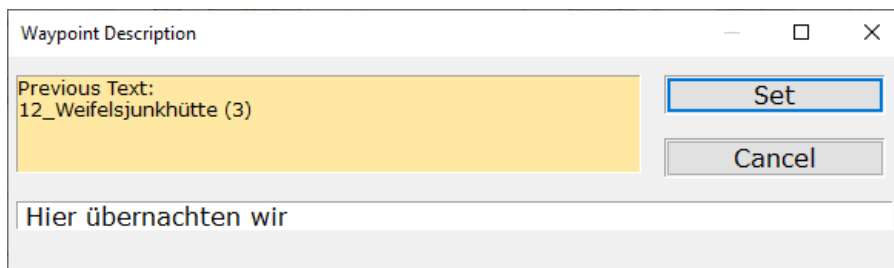
GPX Module Application

Based onto Open Street Map (OSM), you can draw objects like positions[2], waypoints and tracks (with trackpoints). They are vector graphic elements of the program (e.g. tracks are polylines), so that you can move and edit these objects.
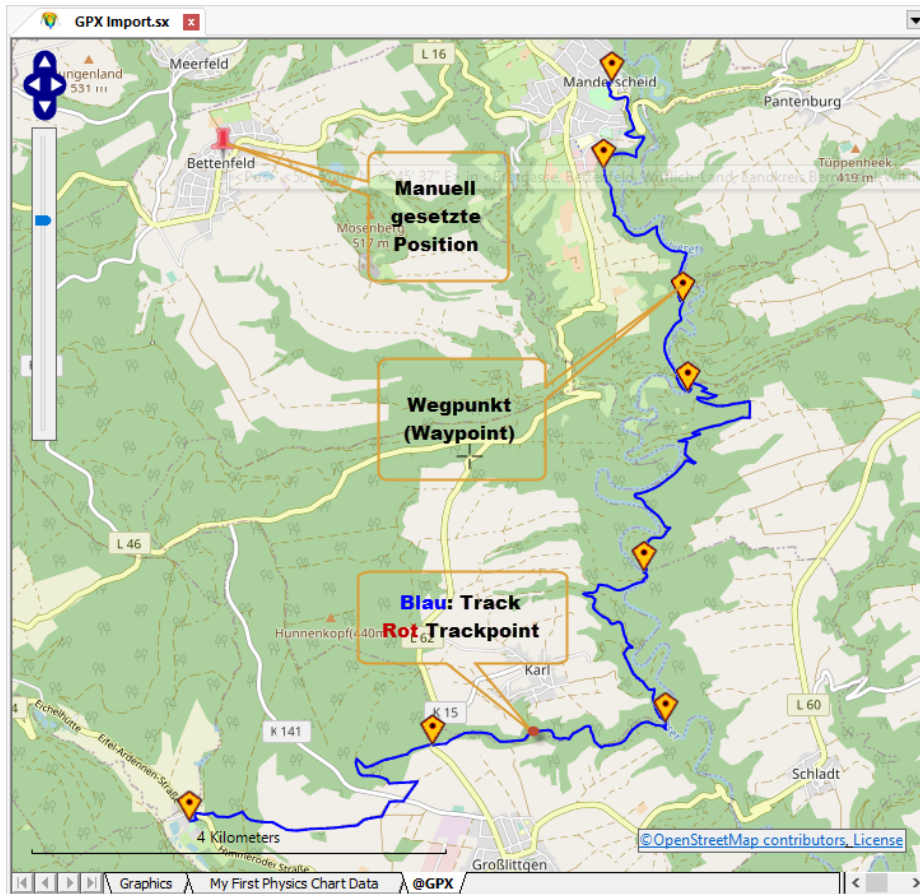
Open Street Map (OSM)

Double click with the left mouse button...

... on a waypoint calls up the following dialog

Enter a text for this waypoint. The previous text is in the field above.

---

[2] manuell gesetzte Positionen werden intern auch als Wegpunkte behandelt

GPX Module

Click with the left mouse button...

 ... to a waypoint and then hold down the left mouse key moves this waypoint.

Click with the left mouse button...

 ... on a track point selects it as a red dot. Holding down the left key and moving the mouse will move this point as well.

Hold down the <Ctrl> key and click on the corner point to...

...select multiple way- or track points.

Hold down the <Ctrl> key and click on...

... on line between two track points moves the entire polyline (track). But only for self-drawn tracks - not for imported tracks, because they are fixed.

Key <Del> (Delete)...

... removes selected waypoint(s) or track point(s).

Key <Ins> (Insert)...

... duplicates selected waypoint or track point.

Click with the left mouse button...

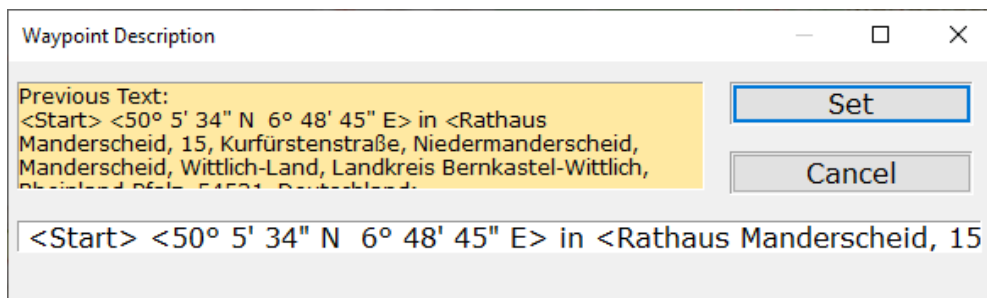 ... between two track points selects the entire track.

GPX Module

Double click on start/end point...

... calls up the waypoints dialog box.

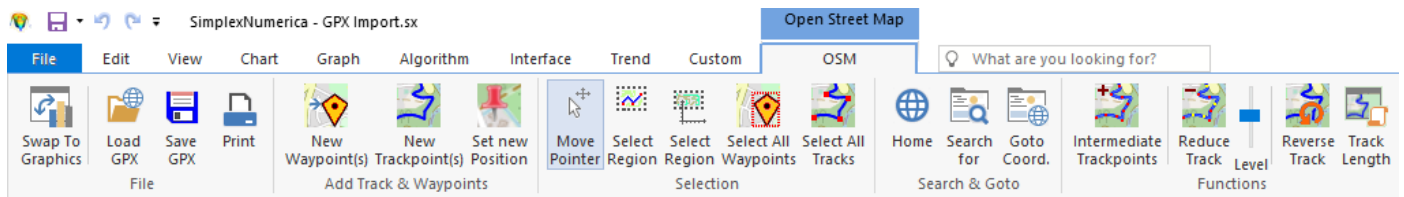Here too, hold down the left mouse button and move the start/end point.

Key <F9> equal to @GPX Tab – Call Open Street Map (OSM) from Graphic Window

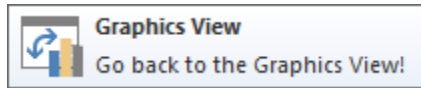... calls the GPX Module from the graphics window.

GPX Module

Open Street Map (OSM) Ribbonbar

See above how this Ribbonbar can be called.

The individual icons are explained briefly here. You can move the mouse over the icons for the tooltips with the same explanations as here.
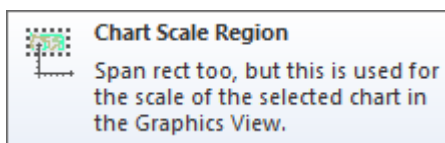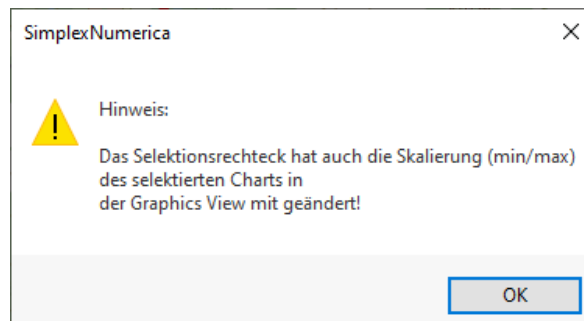
Back to the Graphics View

If a selected chart is in the Graphics View, it will be adapted to the current map section of the Open Street Map window or to the previously selected rectangular region. You can then have the program automatically adjust the size of the chart proportionally to the map region.
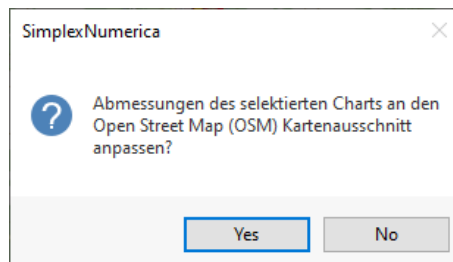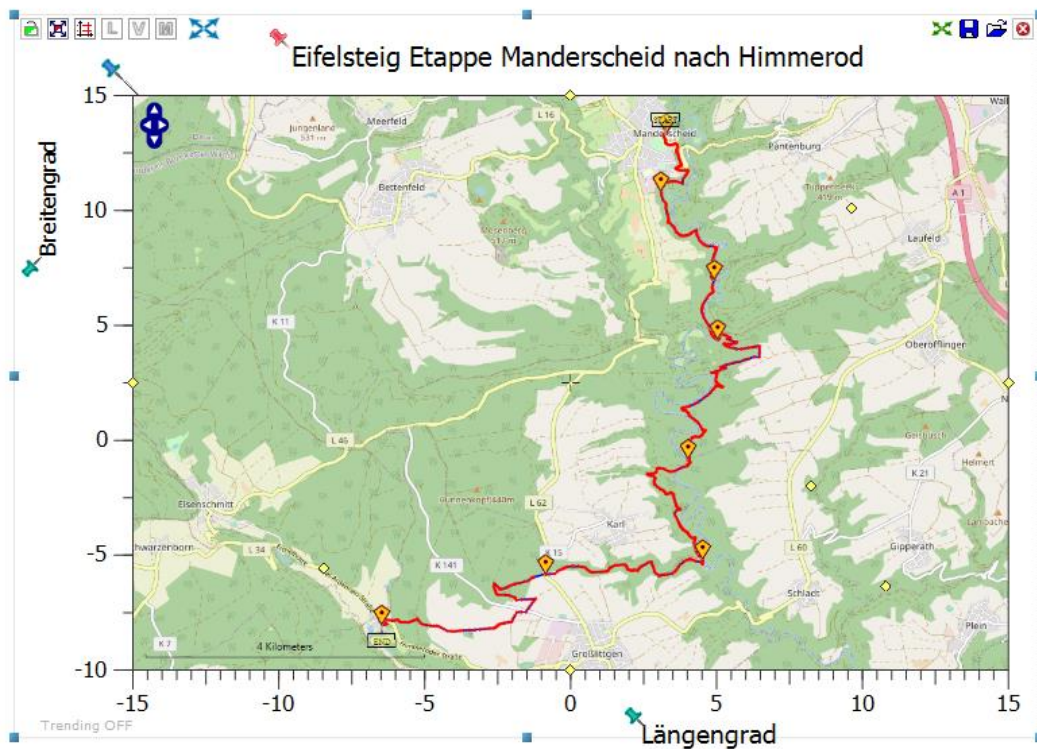

If a rectangular region is spanned with

 then you'll get the following message:

Go back with the icon to the Graphics View. Then, the selected chart should be sized to the spanned region of the map.

Here is the result if no region was spanned. Then the program takes the full window interior.

GPX Module

File Operations

Import GPX
Import (load) *.gpx file

Export GPX
Export (save) *.gpx file

Print Map
Print this map region

Add Track and Waypoints

New Waypoint
Set a new waypoint on a position when you click into the map. To add a waypoint, select one and press key <Insert>To edit the text, double click!

New Trackpoint(s)
Set a new trackpoint line on a position when you click into the map, but hold mouse down and move. To add a single trackpoint, select one and press key <Insert>. To move track, hold <Ctrl> and click & hold the line between two points.

Set Position
Please click on the part of the map where you want to put a new position marker (Fix Waypoint). Hover over this marker to see its coordinates and address.

Selections

Move Pointer
Hold down left mouse to move the map. Use mouse wheel to zoom. Right mouse to call popup menu.

Span Rectangle
Span a rectangle over the track to select way & track points.

Chart Scale Region
Span rect too, but this is used for the scale of the selected chart in the Graphics View.

GPX Module

Select Waypoint(s)

Select all waypoints in the map (or click on an waypoint and delete or move this point; hold <Ctrl> to select more points).

Select Track(s)

Select all tracks in the map (or click on an edge point (vertex) and delete or move this point; hold <Ctrl> to select more points).

Search and Goto...

Zoom Home

Go back home. Hold <Ctrl> key on this icon to set new home!

Search for

Search for points of interest on the map.

Nominatim Suche

Suchen Sie z.B. nach: 'Aachen', 'Regent Street, Cambridge', 'postcode SW1', or 'pubs near Gorey, County Wexford'

Mürlenbach

[Ok] [Cancel]

Search Results from Nominatim

Multiple results were returned. Please select the POI to go to:

Mürlenbach, Osann-Monzel, Wittlich-Land, Landkreis Bernkastel-Wittlich, Rheinland-Pfalz, 54
Mürlenbach, Gerolstein, Landkreis Vulkaneifel, Rheinland-Pfalz, Deutschland
Mürlenbach, Beulertweg, Mürlenbach, Gerolstein, Landkreis Vulkaneifel, Rheinland-Pfalz, 549
Mürlenbach, Steinertweg, Mürlenbach, Gerolstein, Landkreis Vulkaneifel, Rheinland-Pfalz, 54
Mürlenbach, Bahnhofstraße, Mürlenbach, Gerolstein, Landkreis Vulkaneifel, Rheinland-Pfalz,
Mürlenbach, Steinertweg, Mürlenbach, Gerolstein, Landkreis Vulkaneifel, Rheinland-Pfalz, 54
Mürlenbach, Beulertweg, Mürlenbach, Gerolstein, Landkreis Vulkaneifel, Rheinland-Pfalz, 549

[Ok] [Cancel]

Goto Coord.

Goto a specific set of map coordinates.

GPX Module

Goto Coordinates

Setzen Sie das Mittelkreuz auf die Position.:

Längengrad	5	°	53	'	18.3372	"
Breitengrad	49	°	54	'	24.31008	"

Ok   Cancel

Functions

Intermediate Trackpoints

Adds new track points between all the existing nodes of a polyline

Reduce Track

Reduce (decimate) the selected track to less points (remove unnecessary points)

Level Move the level slider to display the desired point cloud of the track. If fits, then release and the previous number

is restored. Now press the corresponding button and the new number will be applied.

Reverse Track

Reverse the selected track (last point first and so on). Useful when save as *.gpx e.g. for your Garmin Navi to drive from end to start.

Track Length

Returns the length of this track in Kilometer and Miles in the Output Window.