

GRASS GIS 7: A theoretical and practical course

Session 1 – GRASS GIS Software installation
Intro QGIS-Processing-GRASS GIS

Markus Neteler

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mundialis GmbH & Co. KG
<http://www.mundialis.de>





Session Objectives

- Download and installation
 - ... of GRASS GIS 7
 - ... of QGIS
- Download of related course data
- Using GRASS GIS in QGIS through “Processing”

Preparation – Download & install the software



GRASS GIS Software:

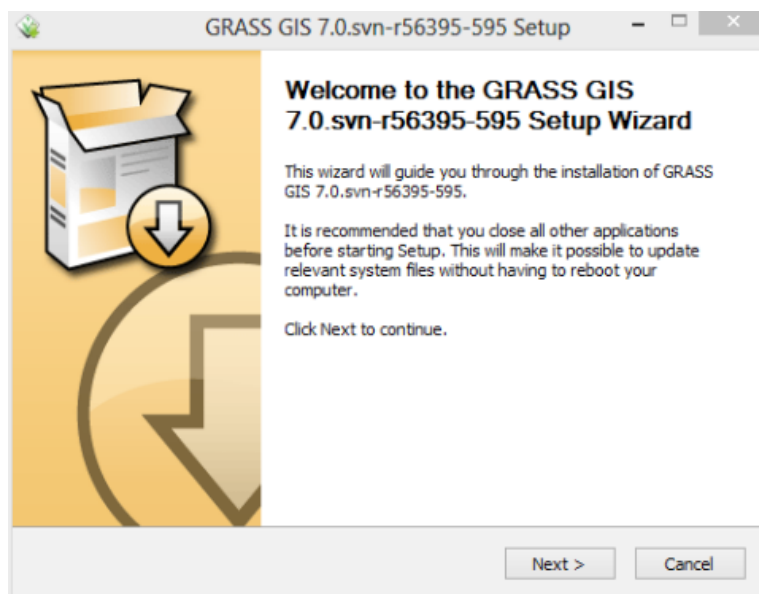
Free download for MS Windows, Mac OSX, Linux (and source code):

<https://grass.osgeo.org/download/>

→ GRASS GIS 7 installers for Linux, Mac OSX, MS Windows

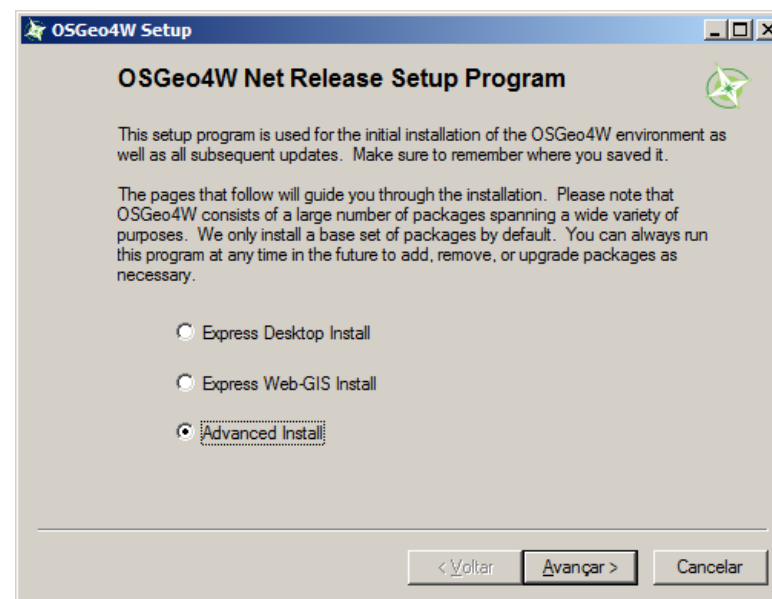
MS Windows: two options are available:

WinGRASS stand-alone installer



(“pure” GRASS GIS installation)

OSGeo4W installer

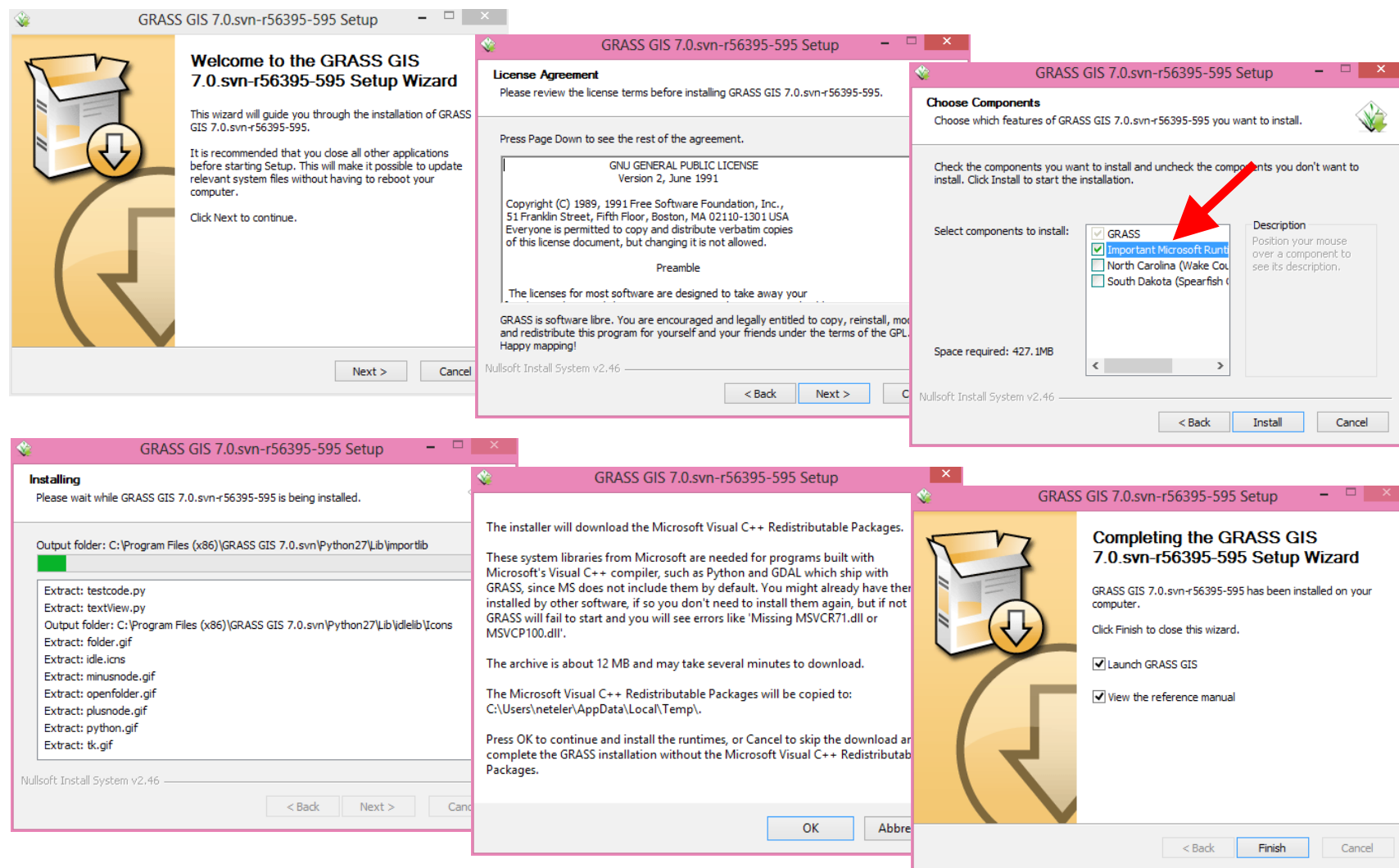


(offers all OSGeo software stack)

Preparation – WinGRASS stand-alone installer



Important for winGRASS installer:
Right-click installer, execute with “Administrator” privileges



Preparation – OSGeo4W installer (1)



Important for OSGeo4W installer:
Right-click installer, execute with “Administrator” privileges

The image displays a sequence of five screenshots from the OSGeo4W installation process:

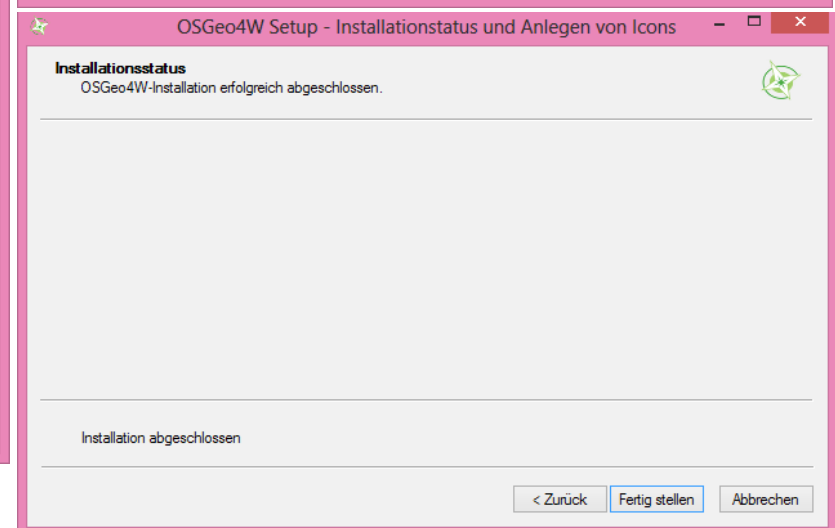
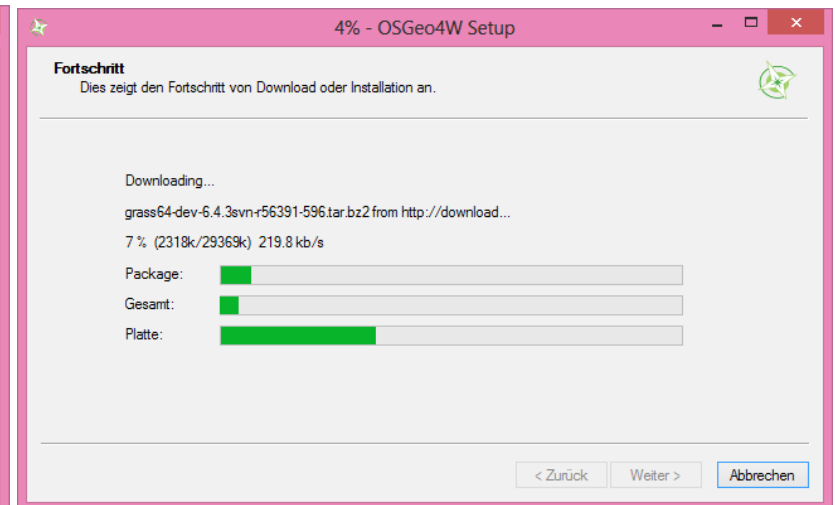
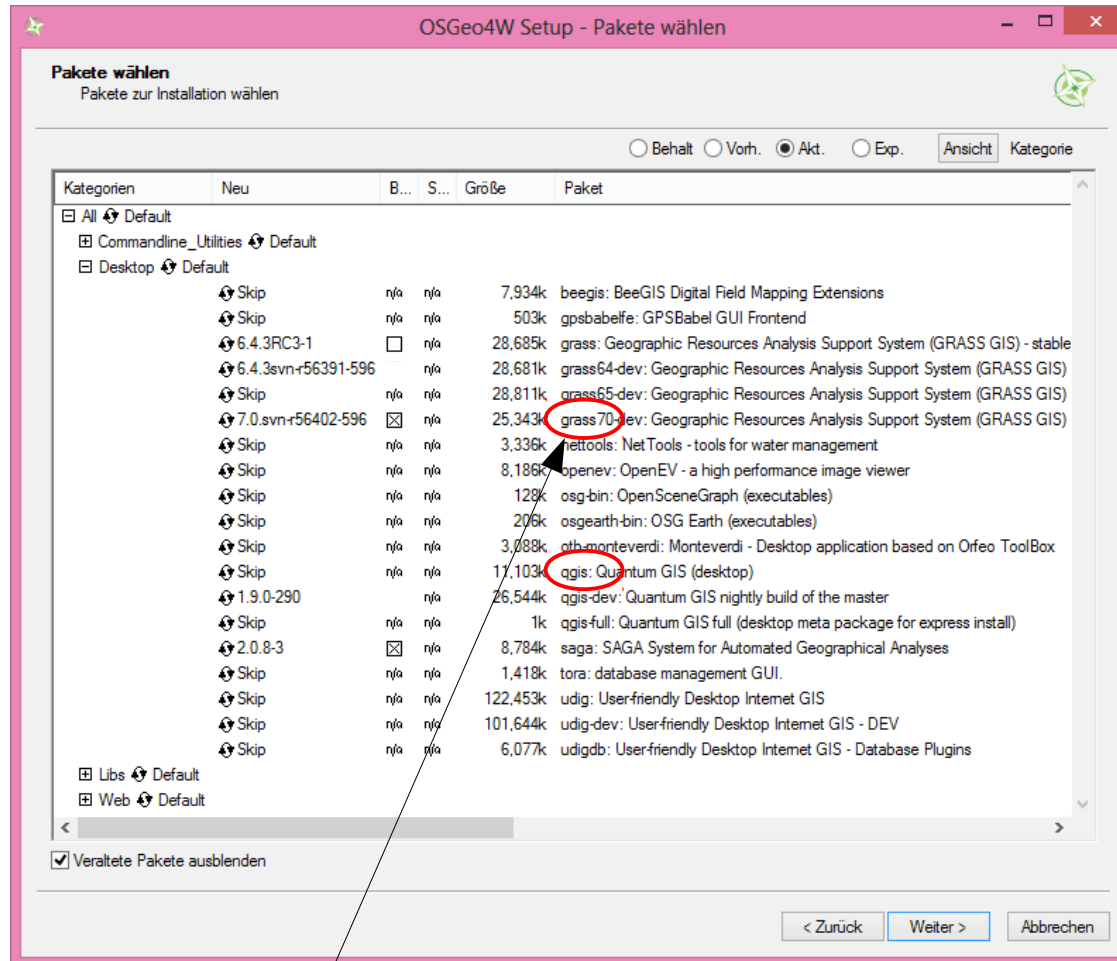
- OSGeo4W Setup - Installationsstyp wählen:** The first screenshot shows the initial setup window with three options:
 - ☒ Aus dem Internet installieren (die heruntergeladenen Dateien bleiben für zukünftigen Gebrauch erhalten)
 - ☐ Ohne Installation herunterladen
 - ☐ Aus einem lokalen Verzeichnis installieren
- OSGeo4W Setup - Wählen Sie ein lokales Paketverzeichnis...:** The second screenshot shows the selection of a local package directory. The text "Lokales Paketverzeichnis wählen" is at the top. Below, it says "Wählen Sie ein Verzeichnis in der Setup die heruntergeladenen Dateien speichern soll. Falls es noch nicht existiert, wird es erzeugt." The input field shows "C:\Users\neteler\Downloads".
- OSGeo4W Setup - Verbindungsart wählen:** The third screenshot shows the selection of an internet connection type. The text "Wählen Sie Ihre Internetverbindung" is at the top. Below, it says "Setup muß wissen wie es sich mit dem Internet verbinden soll. Wählen Sie unten eine entsprechende Option:". The options are:
 - ☒ Direkte Verbindung
 - ☐ Intermeteinstellungen nutzen (IE)
 - ☐ HTTP/FTP-Proxy nutzen:
- OSGeo4W Setup - Download-Quelle wählen:** The fourth screenshot shows the selection of a download source. The text "Download-Quelle wählen" is at the top. Below, it says "Wählen Sie, ob Sie aus dem Internet herunterladen oder installieren oder aus einem lokalen Verzeichnis installieren wollen." The options are:
 - ☒ Aus dem Internet installieren (die heruntergeladenen Dateien bleiben für zukünftigen Gebrauch erhalten)
 - ☐ Ohne Installation herunterladen
 - ☐ Aus einem lokalen Verzeichnis installieren
- OSGeo4W Net Release Setup Programm:** The fifth screenshot shows the main setup window. It contains text about the installation process and a list of radio buttons:
 - ☐ Desktop-Schnellinstallation
 - ☐ WebGIS-Schnellinstallation
 - ☒ Fortgeschrittene Installation



Preparation – OSGeo4W installer (2)

OSGeo4W installer:

Selection of software packages (dependencies are auto-selected)



Select:

- “grass” stable → grass7.0.x
- “qgis” 2.8



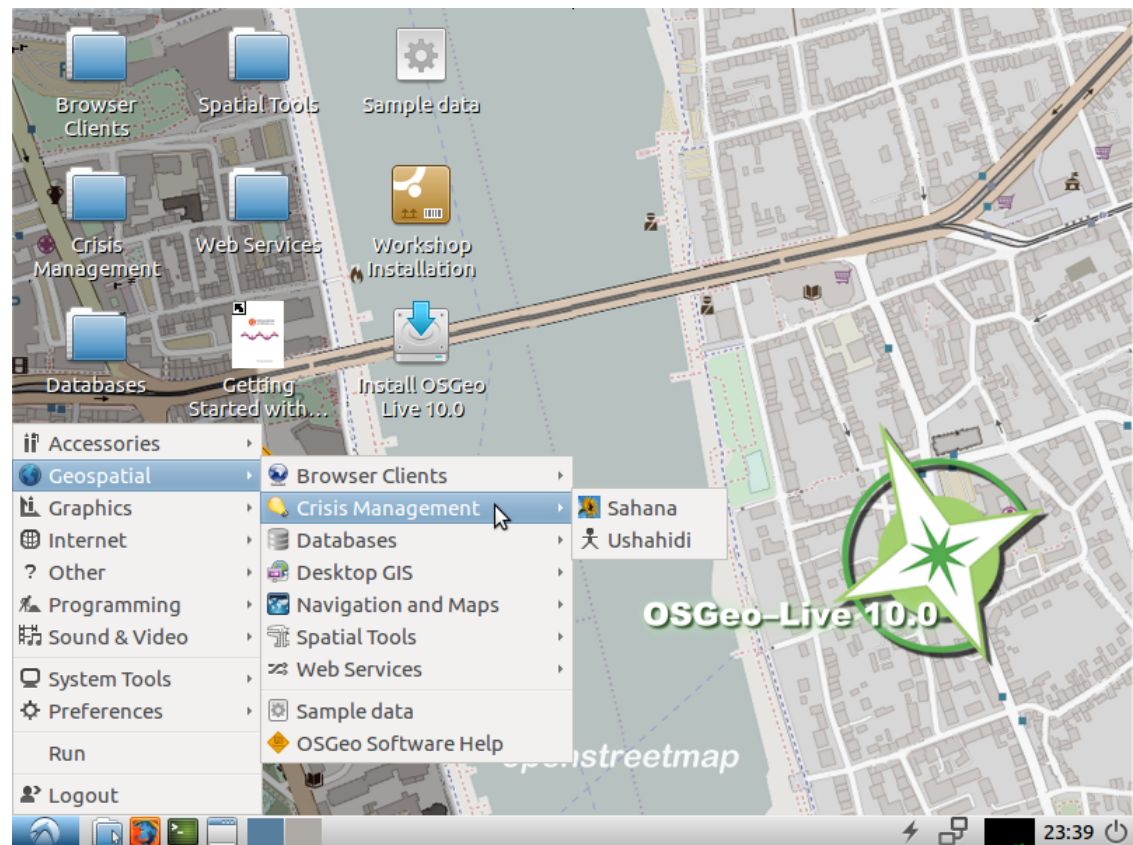
Preparation – Starting OSGeoLive

OSGeo-Live, ISO available from:
<http://download.osgeo.org/livedvd>

Copy to **DVD or USB flash drive**, then boot from flash drive,
or run in a **Virtual Machine** environment.

See: https://live.osgeo.org/en/quickstart/osgeolive_quickstart.html

Sit back while the
system boots up...





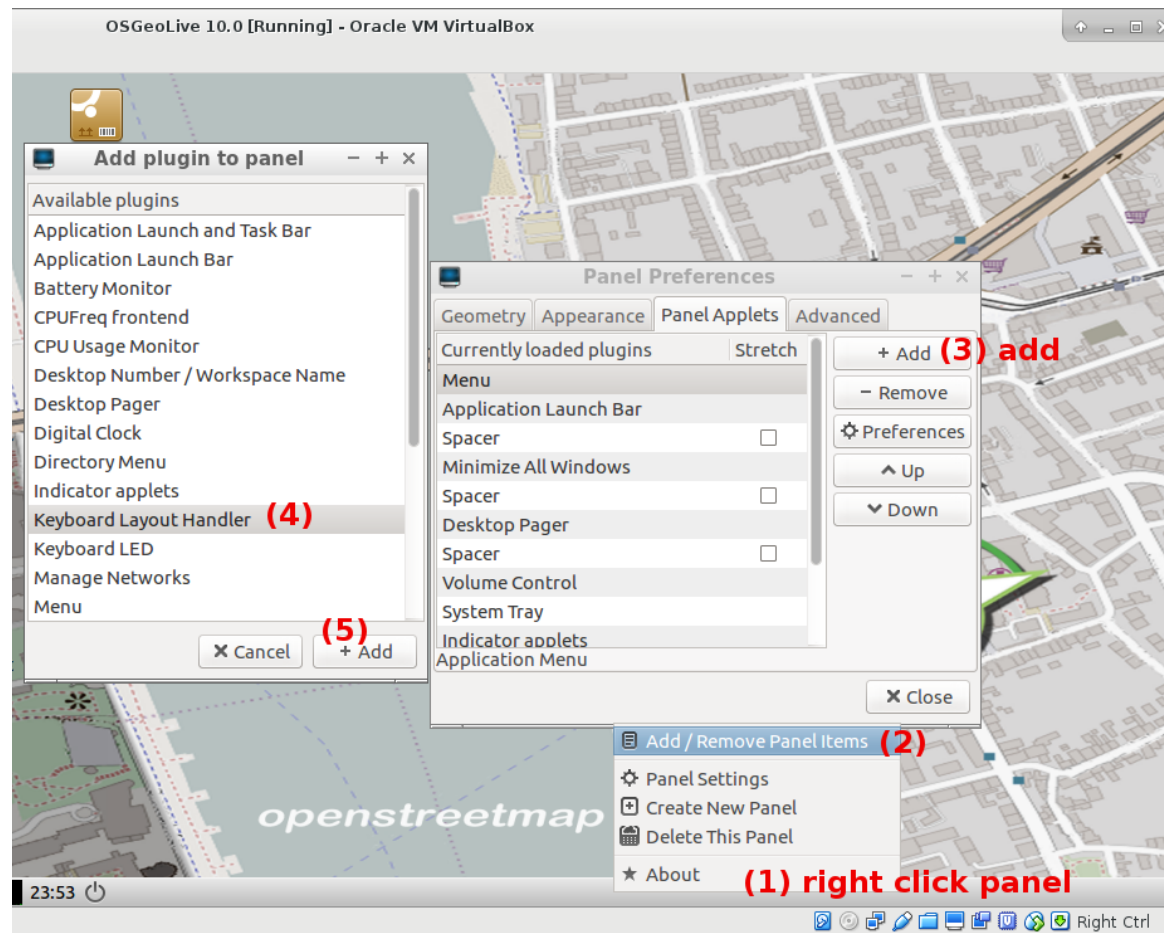
Preparation – Starting OSGeoLive

Configuration of region settings if needed:

OSGeo-Live Internationalisation Quickstart (language + keyboard layout):

https://live.osgeo.org/en/quickstart/internationalisation_quickstart.html

To add a “flag” icon to the lower menu panel, do:



Preparation – Download some course data sets



Please create a “gis_data” directory for the course data:

```
cd $HOME  
mkdir gis_data
```

Data download at:

http://www.mundialis.de/workshops/nina2016/north_carolina/

- nc_zipcodes_wake_SHP.zip 308 KB
- elev_ncstate_500m_tif.zip 1.8 MB
- elev_lid792_1m_tif.zip 1.7 MB
- [...]

Save these **3 files** on your computer into the new “gis_data” directory and unpack them.
The other files we'll download later.

The maps are located in North Carolina, USA.





North Carolina sample data set

Create a “gis_data” directory for the course data (this or file manager):

```
cd $HOME  
mkdir gis_data
```

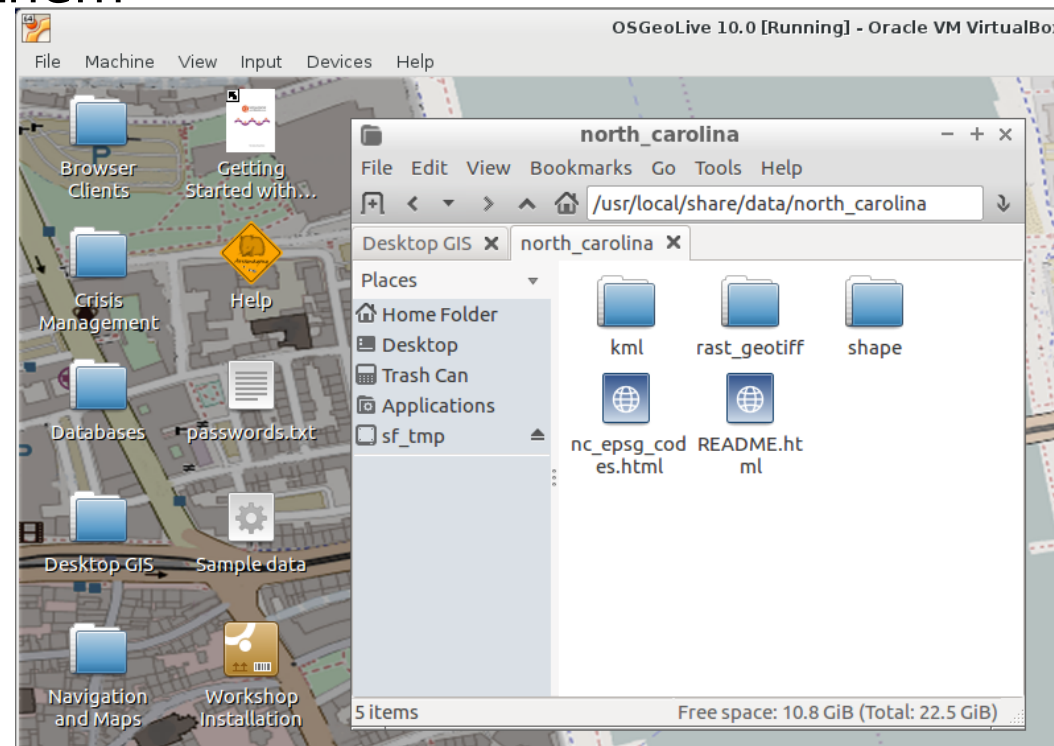
Data files:

Stored in /usr/local/share/data/north_carolina/

- zipcodes_wake.shp (.dbf, .prj, .shx)
- elev_state_500m.tif
- elev_lid792_1m.tif

Find these **3 datasets** and copy them into the new “gis_data” directory.

The maps are located in North Carolina, USA.





Preparation – Unpacking the course data set

Unpacking of the `nc_zipcodes_wake_SHP.zip|.tar.gz`
(ZIP codes map of Wake county in North Carolina)

Linux:



- Create a directory “gis_data” in your home directory and unpack the file therein as follows (or use a graphical program):

```
mkdir $HOME/gis_data  
cd $HOME/gis_data  
tar xvfz /path/to/nc_zipcodes_wake_SHP.tar.gz
```

Mac OSX:



- Create a directory “gis_data” in your home directory and unpack the `nc_zipcodes_wake_SHP.zip` file therein.
-

MS-Windows:



- Create a directory “gis_data” in your home directory and unpack the `nc_zipcodes_wake_SHP.zip` file therein
- Note: avoid white space in the path as well as non-ASCII characters (it may work, though)

QGIS: “GRASS Toolbox” versus “Processing”



Two ways of using GRASS GIS from QGIS

GRASS Toolbox

Processing (formerly SEXTANTE) → GRASS GIS provider

The choice is up to the user. The differences are... (next slide)

QGIS: “GRASS Toolbox” versus “Processing”



GRASS Toolbox

- “traditional” GRASS GIS support in QGIS
- Connects directly to GRASS: uses region information and reads/writes GRASS data format directly

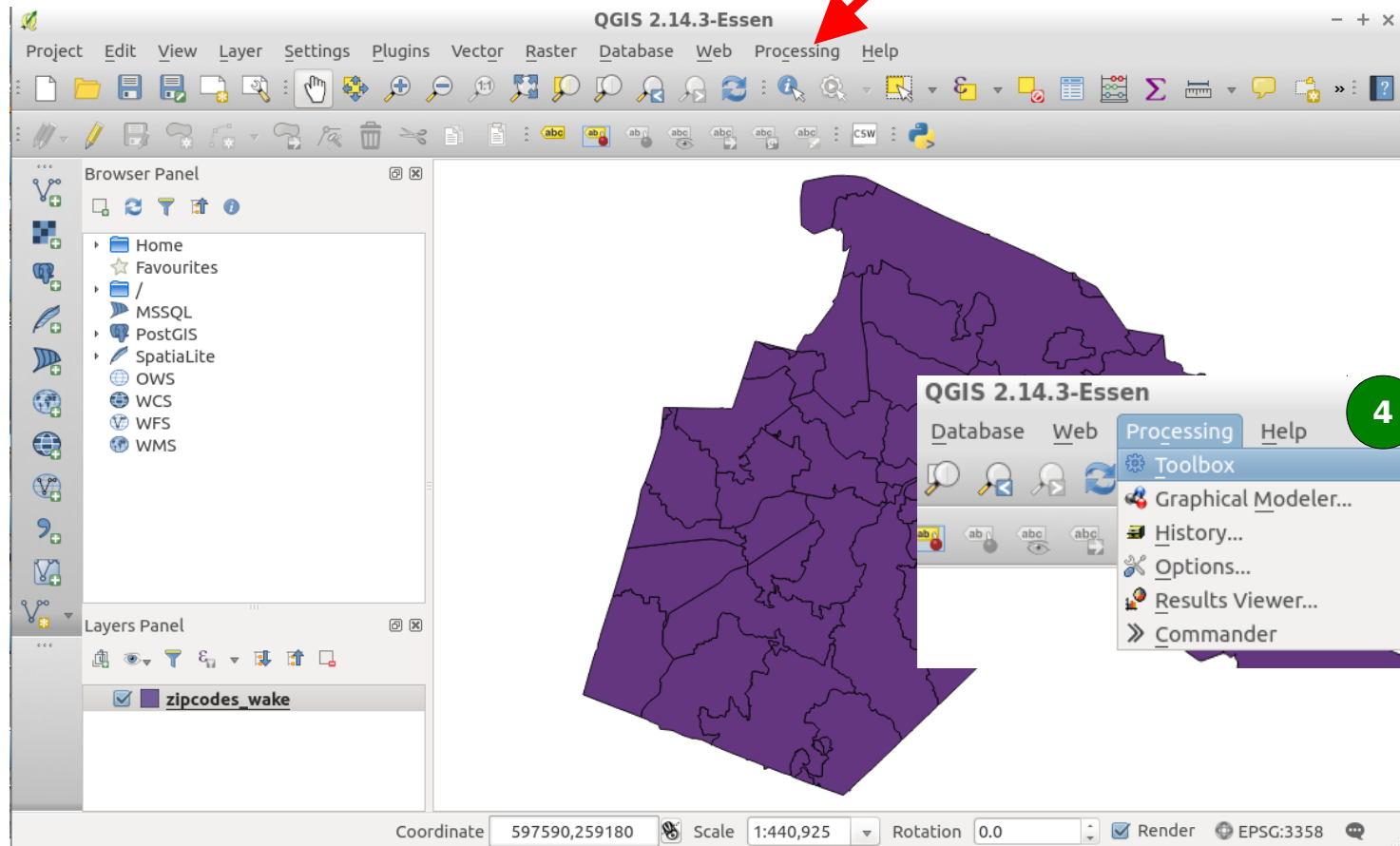
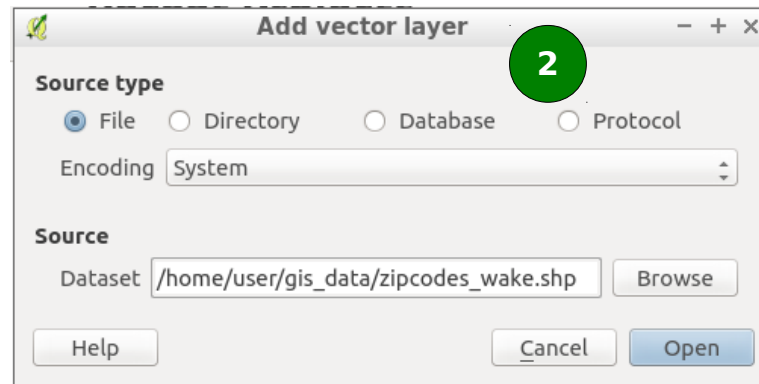
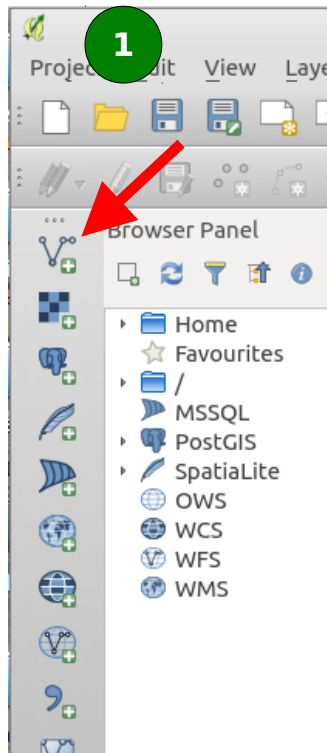
Processing (formerly SEXTANTE) → GRASS GIS provider

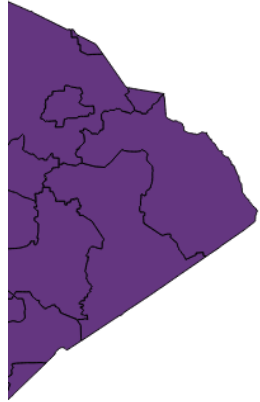
- “new” GRASS GIS support
- Runs GRASS GIS in a temporary session for each calculation
- ... using GRASS GIS from QGIS (internal batch job mode)

So, which one? We will now use “Processing”!

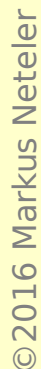
Start QGIS from “Desktop GIS” in OSGeoLive

QGIS-Processing – Using QGIS and Processing

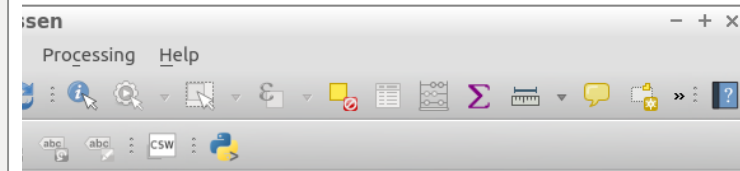
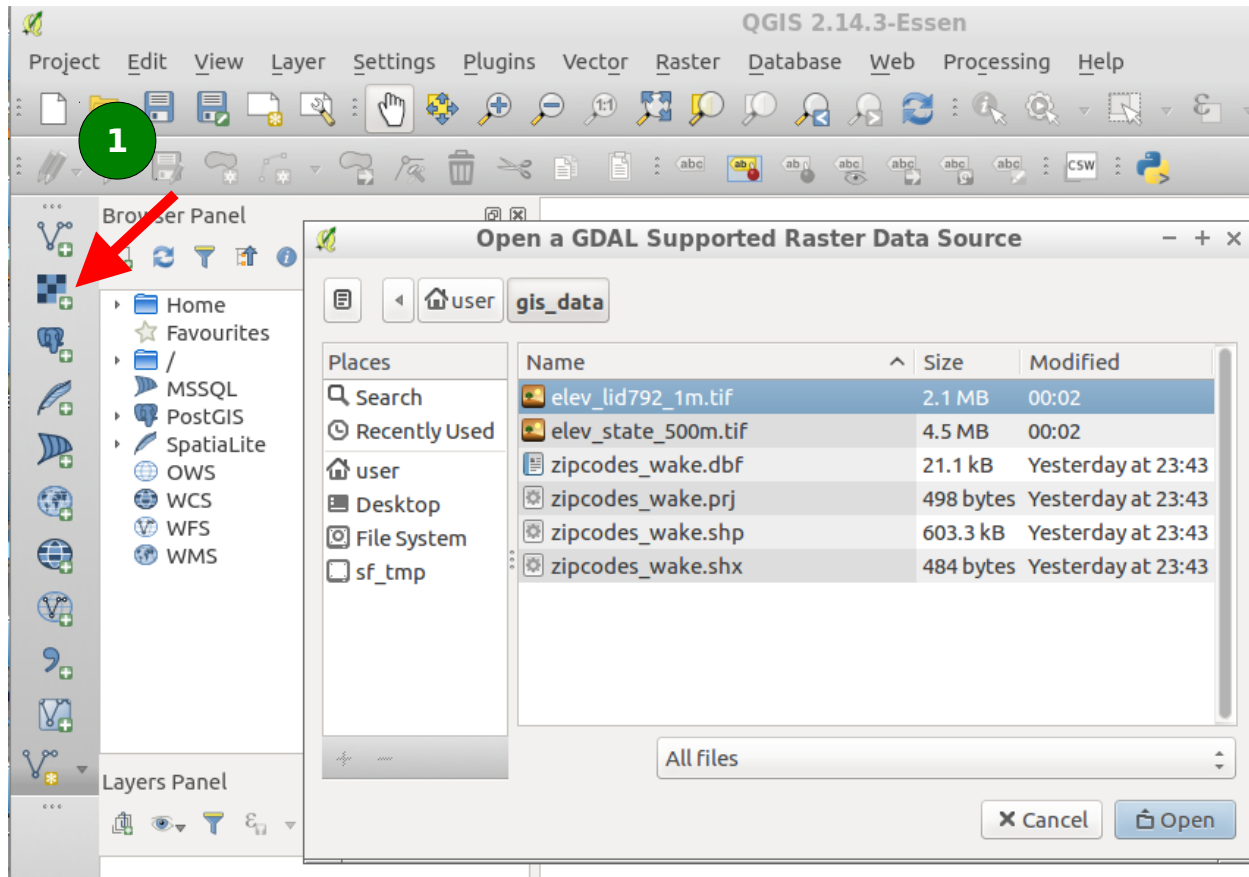




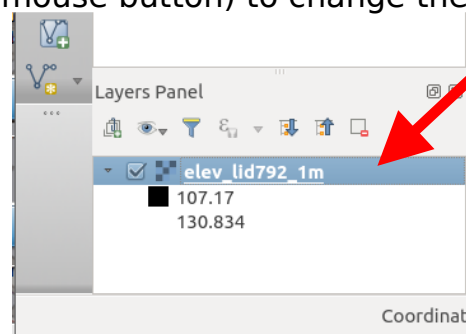
- Processing** calls GRASS GIS in a temporal session which deliver the result back (here: SHAPE file)



QGIS: Raster data: loading a 1m LiDAR map



Once you see the map, select “Properties” in the legend entry of “elev_lidar792_1m” (right mouse button) to change the color style



QGIS: Raster data: styling the elevation map



QGIS 2.14.3-Essen

Project Edit View Layer Settings Plugins Vector Raster Database Web Processing Help

Browser Panel

- Home
- Favourites
- /
- MSSQL
- PostGIS
- Spatialite
- OWS
- WCS
- WFS
- WMS

Layers Panel

- elev_lid792_1m**
- 107.170000
- 113.086000
- 119.002000
- 124.918000
- 130.834000

Layer Properties Dialog - 2_1m | Style

General

Style

Transparency

Pyramids

Histogram

Metadata

Band render

Render type: **Singleband pseudocolor**

Band: Band 1 (Gray)

Color interpolation: Linear

Value	Color	Label
107.170...	Red	107.170000
113.086...	Orange	113.086000
119.002...	Yellow	119.002000
124.918...	Green	124.918000
130.834...	Blue	130.834000

Generate new color map

Spectral

Mode: Continuous

Classes: 5

Min: 107.17 Max: 130.834

Classify

Min / max origin: Estimated cumulative cut of full extent.

Load min/max values

☒ Cumulative count cut 2.0 - 98.0 %

☐ Min / max

☐ Mean +/-

Apply Cancel OK

1 legend entries removed. Coordinate 638064,220274 Scale 1:5,353 Rotation 0.0 Render EPSG:3358 (OTF)



QGIS: Raster data: hillshading

Please try yourself...

The screenshot displays the QGIS 2.14.3-Essen interface. The main canvas shows a grayscale hillshaded raster map of a terrain. The interface includes a menu bar at the top with options: Project, Edit, View, Layer, Settings, Plugins, Vector, Raster, Database, Web, Processing, and Help. Below the menu bar is a toolbar with various icons for file operations, navigation, and processing. On the left side, there are two panels: the Browser Panel and the Layers Panel. The Browser Panel shows a tree view of the file system and network locations. The Layers Panel shows the current map layers, including 'Output shaded relief layer' and 'elev_lid792_1m'. On the right side, the Processing Toolbox is open, displaying a list of processing algorithms. The algorithm 'r.relief - Creates shaded relief fr...' is selected. At the bottom of the interface, there is a status bar showing the coordinate (638284,220637), scale (1:5,669), rotation (0.0), and a 'Render' button.

QGIS 2.14.3-Essen

Project Edit View Layer Settings Plugins Vector Raster Database Web Processing Help

Browser Panel

- Home
- Favourites
- /
- MSSQL
- PostGIS
- Spatialite
- OWS
- WCS
- WFS
- WMS

Layers Panel

- ☒ Output shaded relief layer
- ☒ elev_lid792_1m

Processing Toolbox

Search...

- r.out.ppm - Converts a raster la...
- r.out.vrml - Export a raster layer...
- r.param.scale - Extracts terrain ...
- r.patch - Creates a composite ra...
- r.plane - Creates raster plane la...
- r.profile - Outputs the raster lay...
- r.quant - Produces the quantiza...
- r.quantile - Compute quantiles ...
- r.random - Creates a raster laye...
- r.random.cells - Generates rand...
- r.random.raster - Create rand...
- r.reclass - Creates a new map la...
- r.reclass.area.greater - Reclassi...
- r.reclass.area.less - Reclassifie...
- r.recode - Recodes categorical r...
- r.regression.line - Calculates lin...
- r.relief - Creates shaded relief fr...**
- r.relief.scaling - Creates shaded ...
- r.report - Reports statistics for r...
- r.resamp.interp - Resamples ras...
- r.resamp.rst - Reinterpolates usi...
- r.resamp.stats - Resamples rast...
- r.resample - GRASS raster map l...
- r.rescale - Rescales the range of...
- r.rescale.eq - Rescales histogra...

Coordinate 638284,220637 Scale 1:5,669 Rotation 0.0

Render EPSG:3358 (OTF)