



# GRASS GIS Quickstart

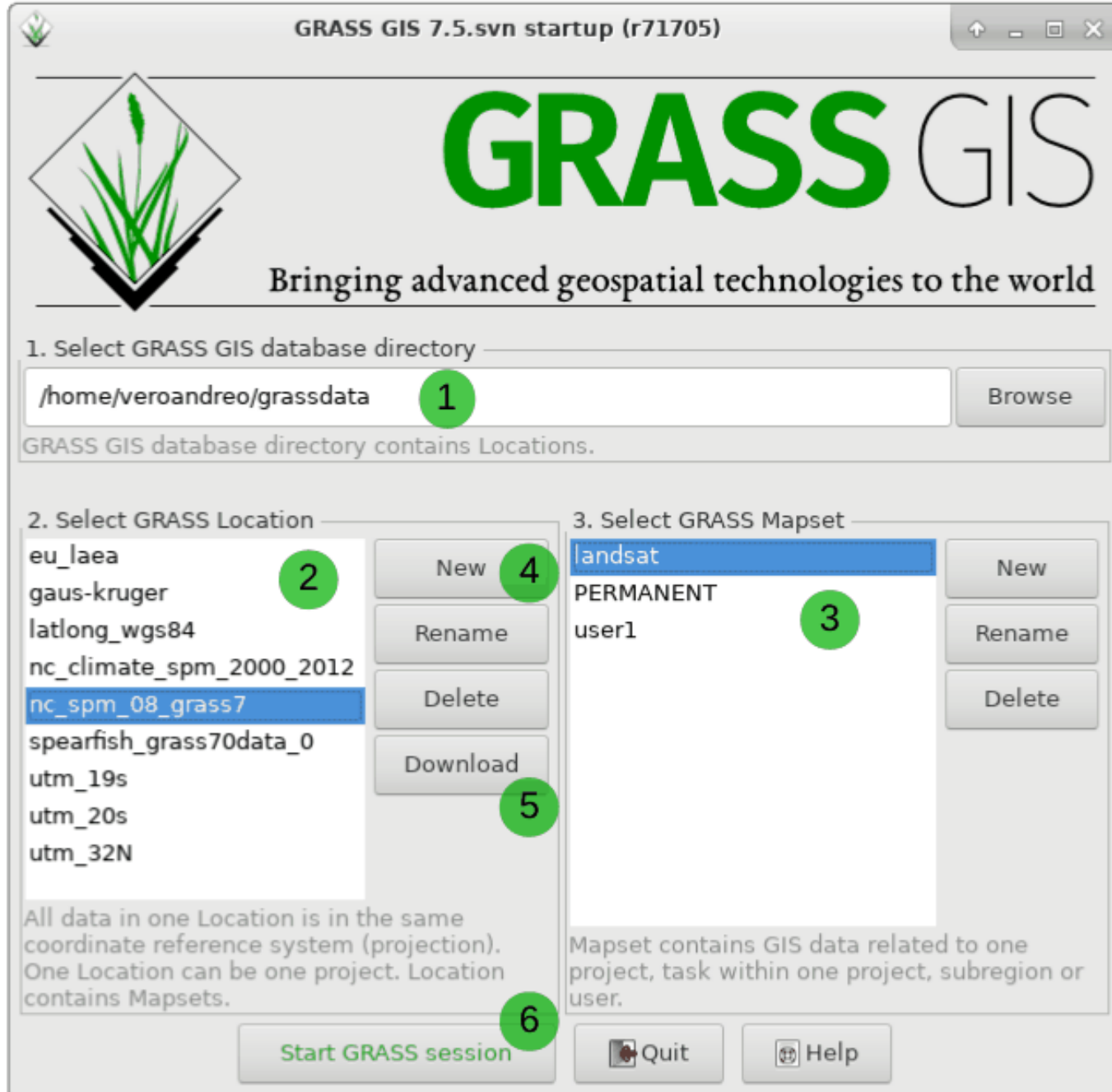
## Geographic Resources Analysis Support System

GRASS GIS, commonly referred to as GRASS (Geographic Resources Analysis Support System), is a free Geographic Information System (GIS) software used for geospatial data management and analysis, image processing, graphics/maps production, spatial modeling, and visualization. GRASS GIS is currently used in academic and commercial settings around the world, as well as by many governmental agencies and environmental consulting companies. GRASS GIS is an official project of the Open Source Geospatial Foundation (OSGeo).

### 1. Graphical startup of GRASS GIS

*For text-based startup see below.*

After [launching](#) GRASS GIS, the startup screen will open:



## 1 Selecting the GIS Database directory

GRASS data are stored in a directory referred to as DATABASE (also called "GISDBASE"). This directory has to be created with a file manager or the `mkdir` command, before starting to work with GRASS. Within this DATABASE, the projects are organized by project areas stored in subdirectories called LOCATIONS.

## 2 Selecting the LOCATION (a project)

A LOCATION is defined by its coordinate system, map projection and geographical boundaries. The subdirectories and files defining a LOCATION are created automatically when GRASS is started the first time with a new LOCATION. It is important to understand that each projection stays in its own LOCATION.

See the "Location Wizard" 4 to easily create a new LOCATION from scratch from a geocoded file, by defining the parameters or by selecting the corresponding EPSG projection code.

See 5 to directly download a sample LOCATION into the DATABASE.

### 3 Selecting the MAPSET (a subproject)

Each LOCATION can have many MAPSETs. Each MAPSET is a LOCATION's subdirectory. New MAPSET can be added at GRASS startup (see related button).

### 4 Location Wizard

The "Location Wizard" let's you easily create a new LOCATION. You will be guided through a series of dialogues to browse and select predefined projections (also via EPSG code) or to define individual projections. You can also create new LOCATION easily from a georeferenced data file (e.g., SHAPE file or GeoTIFF, see below). Find below also some rules to define the default raster resolution for a new LOCATION.

### 5 Download a sample LOCATION

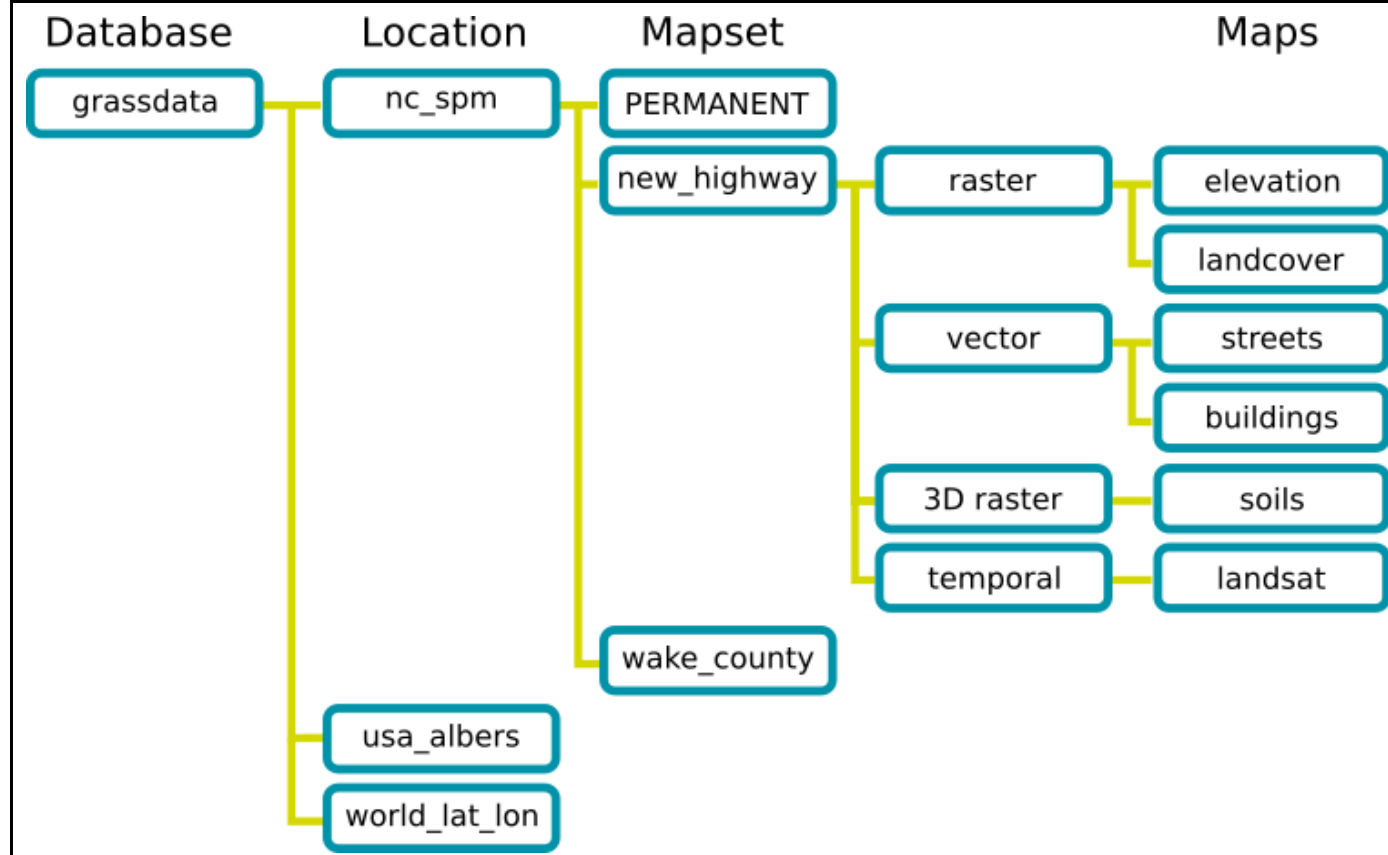
In the "Location Wizard" there is also a Download button that allows you to directly download a ready-to-use LOCATION into the DATABASE. You can choose among different sample LOCATIONS that are currently available at the [Download](#) section in the GRASS GIS website.

### 6 Start GRASS

Once you have selected an existing LOCATION/MAPSET or defined a new one, you can enter GRASS. The graphical user interface [wxGUI](#) will open and provide you with a menu system, map visualization tool, digitizer, and more.

## 2. Background: GRASS GIS Location structure

A LOCATION is simply a set of directories which contains the GRASS data of a project. Within each LOCATION, a mandatory "PERMANENT" MAPSET exists which contains projection information and some more definitions. It can be used to store the base cartography in it as "PERMANENT" is visible to all users accessing a LOCATION.



*Fig. 1: GRASS GIS 7 location structure*

## Creating and maintaining MAPSETs

One motivation to maintain different MAPSETs is to store maps related to project issues or subregions. Another motivation is to support simultaneous access of several users to the map layers stored within the same LOCATION, i.e. teams working on the same project. For teams, a centralized GRASS DATABASE would be defined in a shared network file system (e.g. NFS). Besides access to his/her own MAPSET, each user can also read map layers in other users' MAPSETs, but s/he can modify or remove only the map layers in his/her own MAPSET.

You can learn more about mapsets and how to seamlessly access maps found in another MAPSET of the same LOCATION in the [g.mapsets](#) documentation.

## The role of the "PERMANENT" MAPSET

When creating a new LOCATION, GRASS GIS automatically creates a special MAPSET called PERMANENT where the core data for the project can be stored. Data in the PERMANENT MAPSET can only be added, modified or removed by the owner of the PERMANENT MAPSET; however, they can be accessed, analyzed, and copied into their own MAPSET by the other users. The PERMANENT MAPSET is useful for providing general spatial data (e.g. an elevation model), accessible but write-protected to all users who are working in the same LOCATION as the database owner. To manipulate or add data to PERMANENT, the owner would start GRASS and choose the relevant LOCATION and the PERMANENT MAPSET. This mapset also contains the DEFAULT\_WIND file, which holds the default region boundary coordinate values for the LOCATION (which all users will inherit when they start using the database). Additionally, in all mapsets a WIND file is kept, for storing the current boundary coordinate values and the currently selected raster resolution. Users have the option of switching back to the default region at any time.

### 3. Creating a GRASS Database with Sample Data

To create the GRASS database:

1. Find a place on your disk where you have write access and that has enough disk space to hold your spatial data.
2. Create a subdirectory that will hold the general GRASS database (e.g. using a file manager or with `mkdir /data/grassdata` or `mkdir /home/yourlogin/grassdata`).

Sample data such as the "North Carolina" or the "Spearfish" sample datasets may be downloaded from <http://grass.osgeo.org/download/sample-data/> and the compressed data package(s) extracted into this new database directory.

Now you are ready to select a sample dataset in the GRASS GIS startup screen (see above) and start the session.

### 4. Creating a New Location with the Location Wizard

The [wxGUI](#) graphical user interface provides a graphical "Location Wizard" which lets you easily create a new LOCATION for own data. You will be guided through a series of dialogues to browse and select predefined projections (also via EPSG code) or to define individual projections. The rules to define the resolution as described above also apply here.

*Hint: You can create new LOCATION easily from a georeferenced data file (e.g., SHAPE file or GeoTIFF file with the related metadata properly included). In this case you are asked whether the data itself should be imported into the new LOCATION. The default region is then set to match imported map and the GRASS GIS session is opened.*

After defining new LOCATION, wxGUI starts automatically. If data were already imported, you can add them into the Layer Manager now and display them. If your LOCATION is empty you can import your data from the menu: Go to "File" -> "Import raster/vector data" (see also the related Wiki page on [Importing data](#)).

### 5. Text-based startup and location creation

GRASS GIS can be run entirely without using the graphical user interface. For a first time startup, the following steps have to be followed:

1. Create a GRASS GIS database as explained above.
2. Create a new location, including it's default PERMANENT mapset, without entering the new location:

- Using an EPSG code:  
`grass77 -e -c EPSG:32630`  
`/home/user/grassdata/mylocation`
  - Using a georeferenced raster or vector file:  
`grass77 -e -c MyGeoReferenceFile.tif`  
`/home/user/grassdata/mylocation`
3. Create new mapset within the new location and launch GRASS GIS within that mapset:
- ```
grass77 -c /home/user/grassdata/mylocation/mymapset
```

## Further Reading

Please have a look at the GRASS GIS web site for tutorials and books:  
<http://grass.osgeo.org/documentation/>.

## See also

[GRASS GIS 7 Reference Manual](#)  
[GRASS GIS 7 startup program manual page](#)

[List of EPSG codes](#) (Database of worldwide coordinate systems)

*Last changed: \$Date: 2018-08-31 08:12:46 -0700 (Fri, 31 Aug 2018) \$*

---

[Main index](#) | [Topics index](#) | [Keywords index](#) | [Graphical index](#) | [Full index](#)

© 2003-2019 [GRASS Development Team](#), GRASS GIS 7.7.svn  
Reference Manual