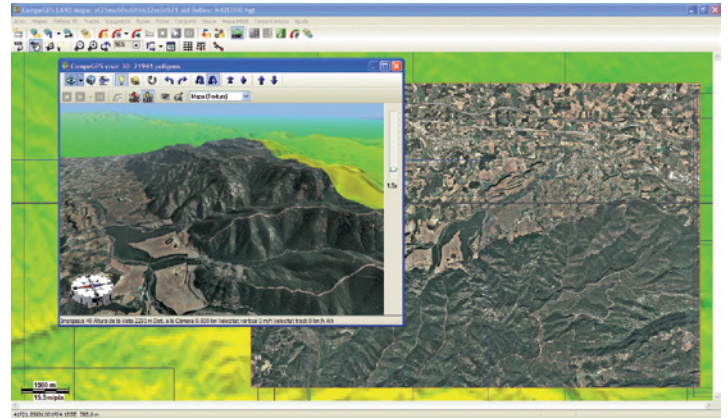


Third chapter: Everything about Maps

The program CompeGPS Land can perfectly work without maps, but it goes without saying that using adequate maps enrich and optimize our work. It also increases fun when working with GPS data. CompeGPS Land works with digital maps in many different formats and allows you to obtain them in various ways. In this lesson, you will learn how to download maps the most suitable maps (could be free or paying ones) and to digitize and calibrate a paper map you already have, so that you can open it with this program.



TYPES OF MAPS:

There are two types of digital images: raster images, also known as bitmaps, and vector images. Unlike other similar programs, CompeGPS Land can work with both types of images, so that you can differentiate the following types of maps:

- Raster maps:

They comprise a digital image file (the drawing of the map) which is essentially a mosaic of coloured dots called pixels, and a georeferencing file that contains all information to be able to refer to a system image known as coordinates. This file sometimes contains information about the map projection and datum used. These are files with extensions .sid, .rmap, .ecw or .jpg.

- Vector maps:

They are composed of lines and polygons defined by coordinates, which does not normally need to be accompanied by a georeferencing file. Sometimes, if the coordinates information of the elements is incomplete, you will need to 'Import the map' to indicate what types of coordinates and datum it is using. These are files with extension .shp, .dwg, .dxf, .mpv or .vmap (CompeGPS own format).

- Relief maps:

Also called 3D maps, consisting of a grid with points that indicate its coordinates and the height of each point. The precision has been given by the separation between its points (less separation, more accuracy) and are essential to see the terrain in the 3D viewer of CompeGPS Land. The formats are .dem, .3dr, .hdr, .hgt or .cdem (CompeGPS own format).

- Hypermap:

CompeGPS has developed a new

concept with its Hypermaps, which are maps that can mix different formats (eg an orthophoto, a relief and a vector map). Are .imp or .hmap formats.

- Overview maps:

An .imp map format developed by CompeGPS which has different levels of zoom and is capable of manipulating pieces of mosaic and departments in .rtmap format, quickly and efficiently, no matter the size of the map.



Figure 1

MAPS DOWNLOAD:

In CompeGPS Web (www.compegps.com), in the 'Products' tab, there is a section called 'Maps', from which you can download a wide range of them (Figure 1). CompeGPS has a wide catalogue of topographic maps around the world. You will find in all them the information necessary to prepare and carry out your excursions. They are fully compatible with CompeGPS products and can be opened directly from the program, which allows working with the many functions of CompeGPS Land. If you have found a map of the zone of your interest, you can display it before buying under the Maps Viewer, what shows you the area covered by the map and also choose the map you wish to acquire (Figure 3). A menu on the right will allow you to access the shopping cart, where, after registering, you pay through our credit card in a safe operation and download the map. Some countries like Spain, France, Switzerland, Germany, Belgium, Norway, etc. can offer you the possibility to acquire only a small area of interest, called map tile. These map tiles will let you get only the area you wish, without having to acquire the entire map. Look for the denomination 'Mosaic map' in the CompeGPS map catalogue (Germany Topo Mosaic, Netherlands Topo Mosaic, etc). In some countries like Spain and France, CompeGPS has developed this concept farther, creating not only Mosaic maps, but dividing them into Provinces, Départements or Zones.

Let's see examples:

- **France Topo Départements:** this product includes the ultimate topographic data available for the French territory, splits into the administrative divisions of the country (Départements) (39€/each).
- **Spain Topo Provinces:** If the tiles from Spain Topo Mosaic do not contain the whole area of your interest, it might do so with the Provinces (19€/province).
- **Spain/France Topo Zones:** If your limits are located beyond your own province/département, you can also get a zone of Topo Spain or France.

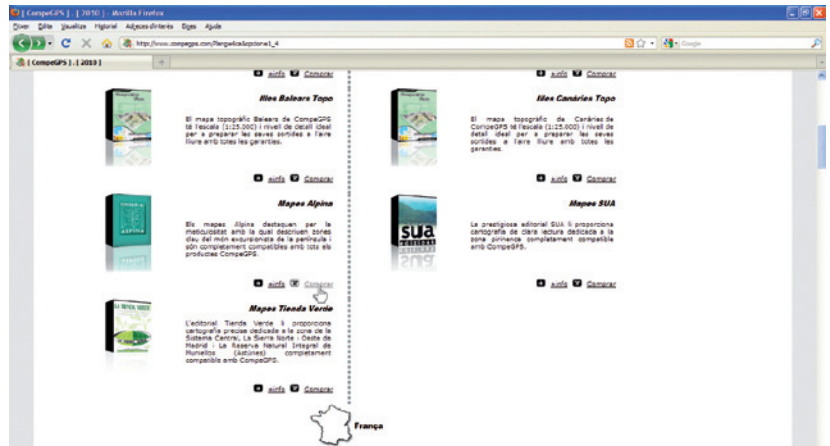


Figure 2

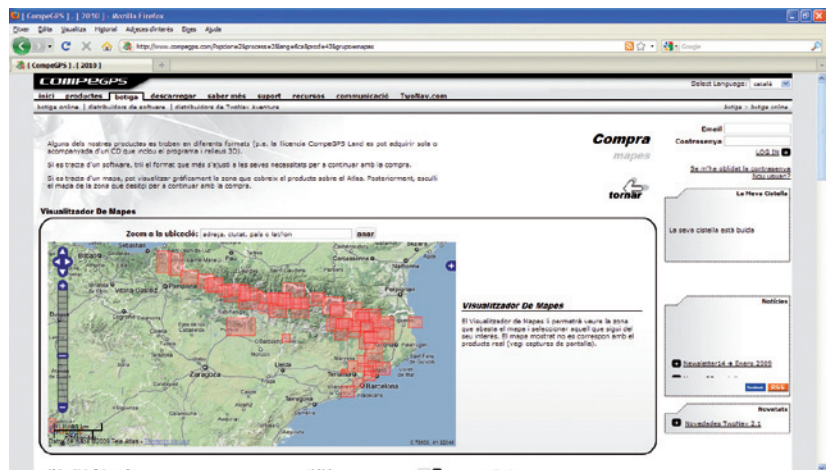


Figure 3



Figure 4/5

Besides these maps you can find also other collections that cover with great level of detail specific areas of other countries, like Austria Freytag & Berndt or Italy 4Land.

For free maps, download them directly through CompeGPS, using 'Download Internet map for this area'. At the right side will open the 'CompeGPS Download Maps Service' with a list of maps (free and payment), which includes numerous free maps, like the maps of the ICC, The Spanish Cadastral or IGN. Land CompeGPS is compatible with files .sid, .dgn and .dfx, although the latter needs a CompeGPS AutoCAD Module.

CompeGPS Land setup creates, in the default folder 'My Documents', a new folder named 'CompeGPS'. Inside you can find the folder 'Maps', where you store the downloaded maps (both the purchasing and the free ones). If you prefer to save the maps in another folder, you can, but you might first tell the program where to find them. To do this, run CompeGPS Land, and on the 'File' menu, choose 'Options' (Figure 6).

You see a new window with all the program options. Later we will analyze them all, but today you go to 'Maps' (click on the + sign to display the data tree), then on 'maps' folder. At the right you will see the default folder. The 'Add' button will allow you to add a new folder where to put the maps, the edit button will allow you to modify the current and 'Remove' button, delete the link (Figure 7). Since this moment, from the menu 'Maps', into 'Open Map' section (or using the shortcut Ctrl+M), you will directly access to the folder where you saved the maps and from where you can open them again.

SCAN AND CALIBRATE A MAP:

If you need to work with CompeGPS on a map you have on paper, it is essential to calibrate it first (geo-reference it). CompeGPS Land allows you to calibrate it if you digitalize it previously. The best way is to scan the area of interest from the map. If the map is too big to do it once, you can scan the map for parts and, with a drawing program, merge the images to have just one (for exemple with Photoshop).

Save the image in .jpg or any of the most used formats in the folder 'Maps' and execute CompeGPS Land. Go to menu 'Maps' and click on 'Calibrate a map from an image' (figure 8) and in the window that appears, navigate through folders on your computer to find the scanned image. Select it and click 'Open'. In CompeGPS Land desktop will appear the image of the map and below, a new tab with the options you need to calbrate the map (Figure 9).

The data to fill in the boxes in the first tab, which refer to the projection of the map, you will get them from the head of the scanned map. All the maps have these data printed on it (figure A).

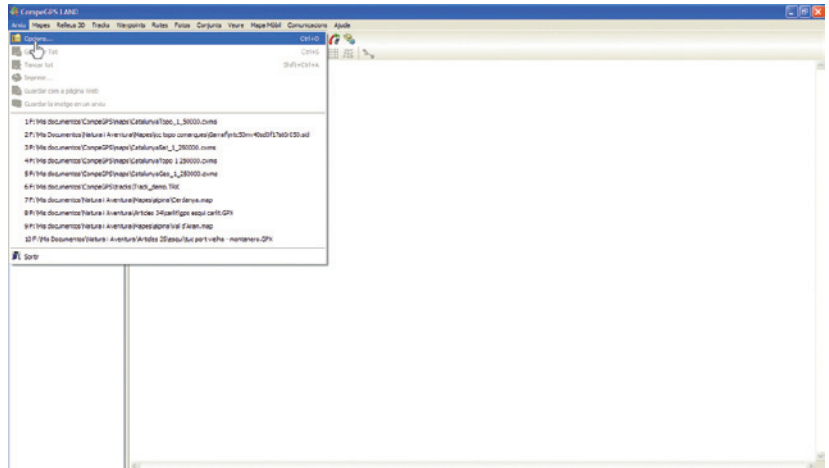


Figure 6

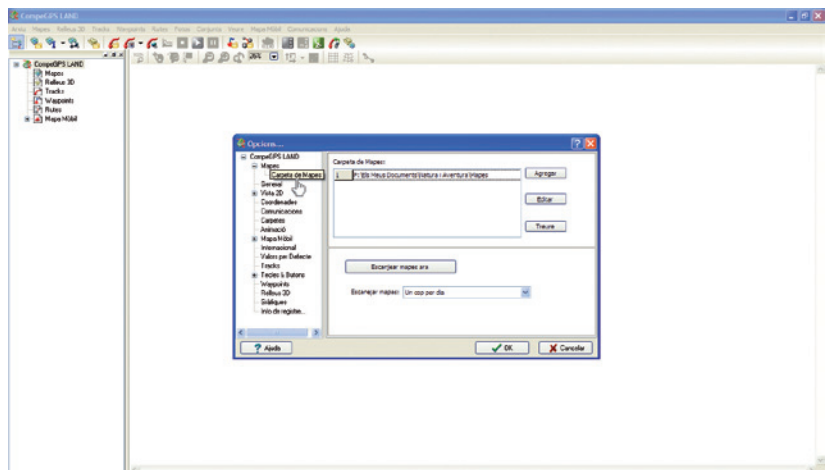


Figure 7

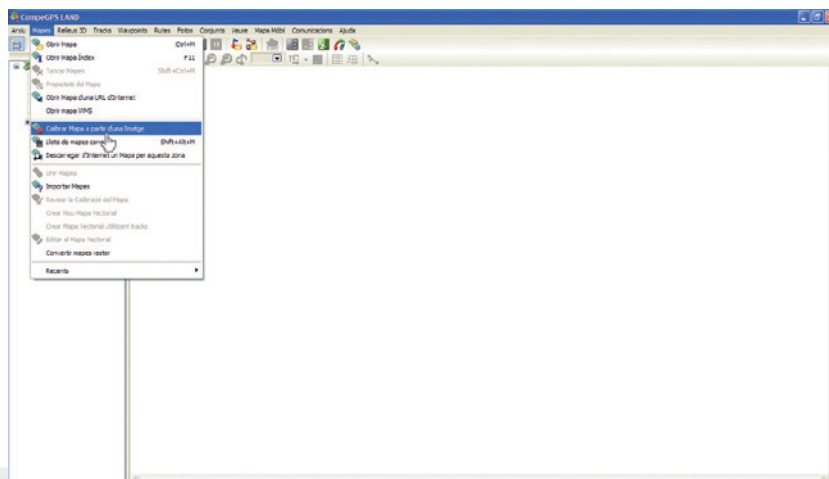


Figure 8

In our example, the projection is UTM, the datum is European 1950, the area or zone is 31 and the northern hemisphere (N). Calibrate a map is to associate pixels of the image with its geographical location, assign to each point its geographical coordinates. This action is also called georeferencing the image. No need to georeference all the pixels in the image, with two or three is enough. To do this, first click on the tab 'Point'

1. Seek a point on the map which you know the exact coordinates (i.e. where the lines cross the grid, coordinates that are at the margins of the original map). You can zoom in and out the map with the magnifying tool and move around with the displacement tool. Click on the image at the desired point and enter the coordinates of the point (in meters if you work with UTM). Figure 10 shows the margins of the map at the height of the grid lines, where you can observe the values of x and y axes (longitude and latitude). Click on 'Next' to repeat the operation with other known locations. Once all the coordinates are put, it will require you to save the georeference file with extension .imp, in the same folder where you saved the image you have. If you ever want to check the calibration of map, when you have it loaded into the program you can right click on the image and choose the option 'Edit' and then 'Check calibration of map'.

It's done !

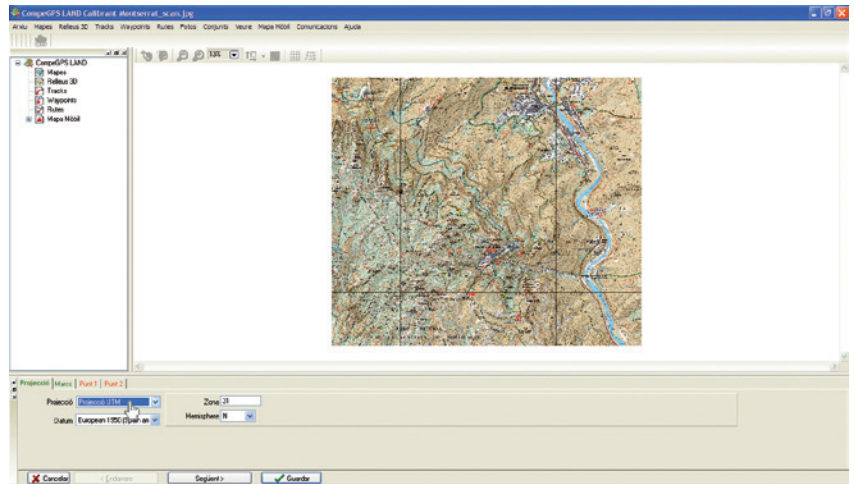


Figure 9

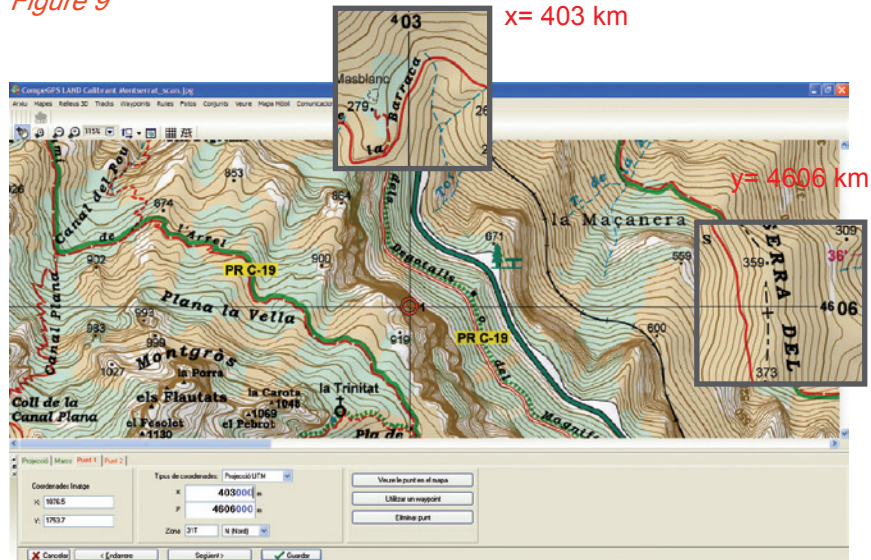


Figure 10

Information to be considered in the map legend:

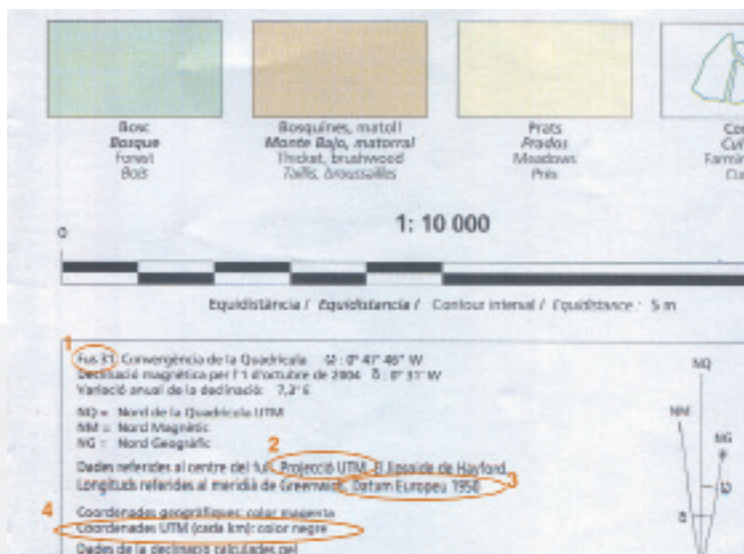


Figure A

The legend of the maps often shows us all the information we need to be able to calibrate the map. In this example we will see the legend of an Alpina Editorial map.

1. Time 31: UTM projection divides the earth into 60 zones or different zones. Catalonia is in the zone 31.
2. UTM Projection.
3. European Datum 1950.
4. UTM coordinates (each km) – black color: the margins of the map to find the coordinates of the grid lines to help us to know the coordinates of specific points-intersections between grid lines, needed to calibrate the map. It also shows that the numbers are in kilometers, as CompeGPS Land works with meters, we multiply it by 1000 (add three zeros) figures for the coordinates x and y. The value of the x-axis (horizontal) is the length, and the y-axis (vertical), the latitude.