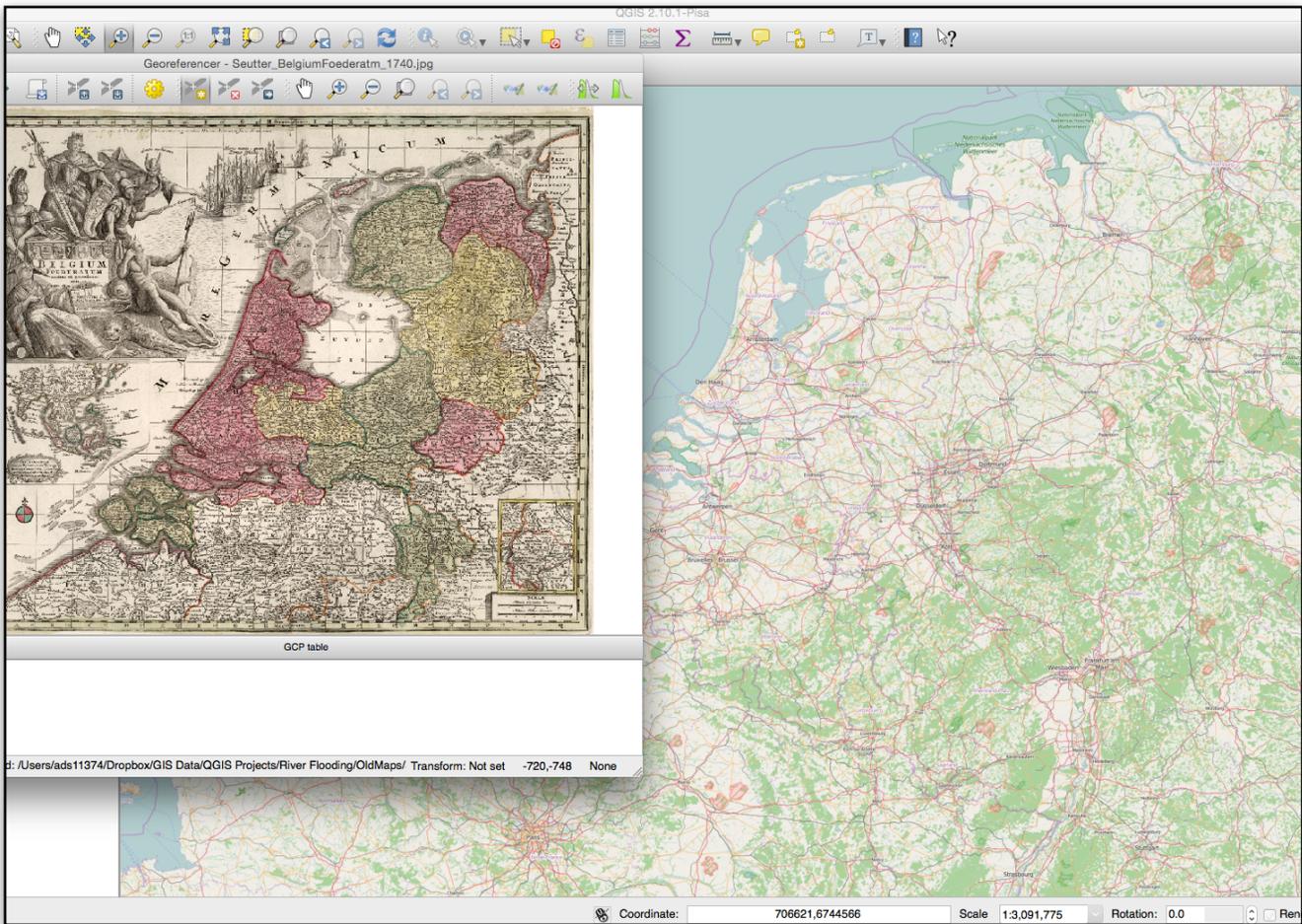


Georeferencing in QGIS



Introduction

Georeferencing is one of the most useful tools for historians. Historic cartographic data can be digitized (scanned, downloaded) and assigned coordinate data on a modern map projection using both web and desktop applications. Once the historical map is assigned “control” points that pin the map to a modern base map, the historical information embedded in the original map can be overlaid making comparison between historical maps and current maps more legible. This “raster” (image) layer will be warped and transformed in a process called “rubber sheeting” to fit to the control points you have assigned. Some knowledge of the history and environment of a region is necessary to assign accurate control points.

Instructions

1. Your first step is to obtain an appropriate historical image you would like to georeference. There are a number of sources you could obtain these from (see Mapping Resources on course blog). For the purpose of this exercise, choose an image from www.davidrumsey.com. The map image can be of a region of your choice provided you are familiar with the local environment (knowing relative location is critical for effective georeferencing, especially with older maps).

2. Download the highest resolution image possible. The higher the resolution, the more detail you will be able to harness (something particularly useful when georeferencing control points).

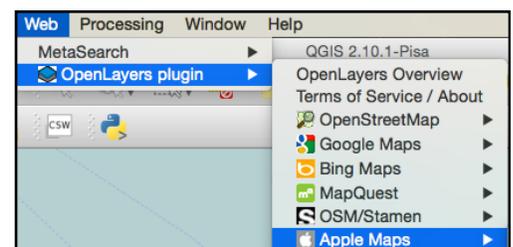
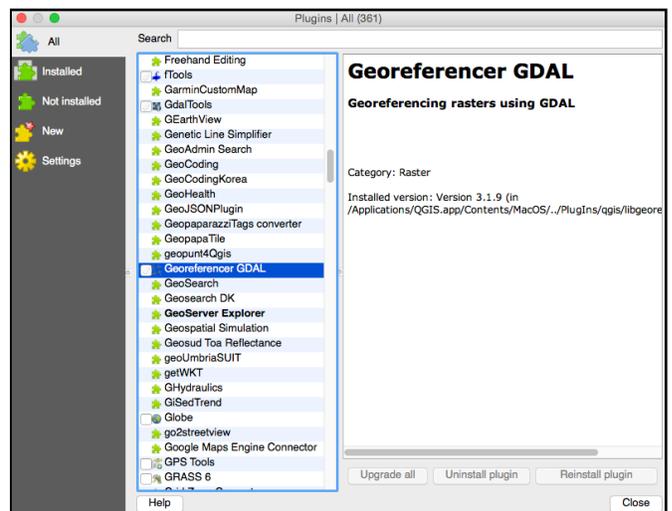
3. Do NOT save this image to your desktop or leave it in your downloads folder. Save this image in your the google drive folder you installed to your hard drive or another clearly directory of your choosing. for instance ...HIS317/ Week4/ It will be useful for you to maintain a clear organization as we produce more and more projects. Stay organized!

4. Open QGIS.

5. You will need to add a base map with a projection in order to assign coordinates to your downloaded map (raster) file. To do this, we will have to activate the “georeferencer” plugin. On the toolbar, click on Plugins - Manage and install plugins

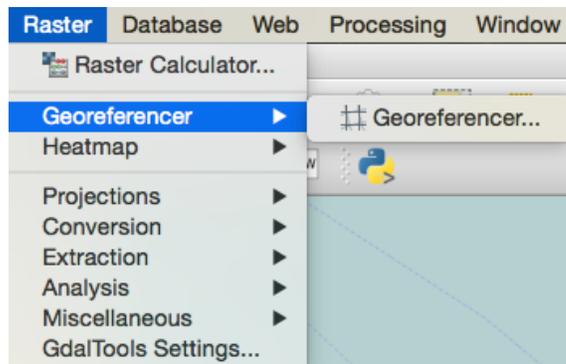
6. In the plugin manager window, find the Georeference GDAL option and click the box. Beneath that, make sure to also check the “openlayers plugin” box. This will allow you to use openstreetmaps, google and bing maps, as well as several other open source base maps.

7. Your plugin is now installed. Shut down QGIS



and restart the program. When it restarts, you will have the “georeferencer” option available to you on the toolbar beneath “raster.”

8. On the toolbar, beneath “web” select “openlayers plugin” and “openstreetmap.” This will bring up the openstreetmap global base map. Zoom to the area on the base map that corresponds to the area of your downloaded historical map.



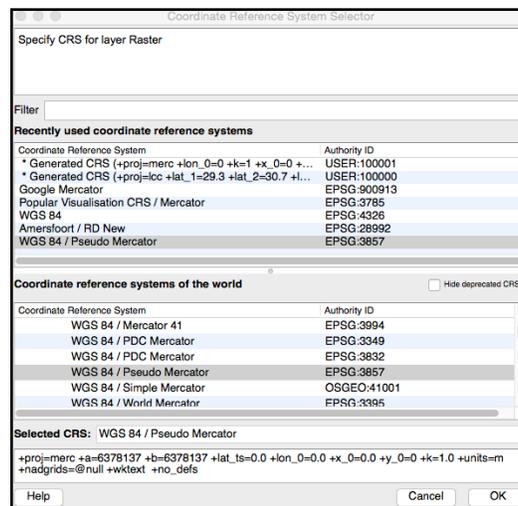
9. Click “raster,” “georeferencer” and select georeferencer program. This should bring up a new window. From this window, you should be able to import your downloaded map image.

10. In the georeferencer window, click on the checkered square. In QGIS, this symbol refers to “raster” image files. These can be imported in the GIS.



11. In the new “open raster” window, find the image you downloaded from davidrumsey.com and double click it.

12. QGIS immediately brings up a new box asking you which CRS (coordinate reference system) you would like to assign your new map. In general, it is a good idea to keep the same CRS as your basemap. Openstreetmap uses a “geographic coordinate system” called **WGS 84/ Pseudo Mercator**. You can either browse or search for this CRS using the selector window. You can also search for the CRS’s EPSG code, which is **3857**. Click “ok.”



13. Now, the raster file of your downloaded map should appear in the georeferencer window. You will have to assign “control points” to this map that correspond between the historic map and the same spot on the current openstreet base map. To make sure your georeferencing is as accurate as possible, zoom into a known location and click the yellow “add point” button. (Point refers to control points).



14. A new window will appear where you can either add map coordinates (see instructions in window or an option at the lower left to match your selected point with a point “from map canvas.” If you don’t know the coordinates of your location, select the latter. Your georeferencer window will minimize. Click on the same location on your base map.

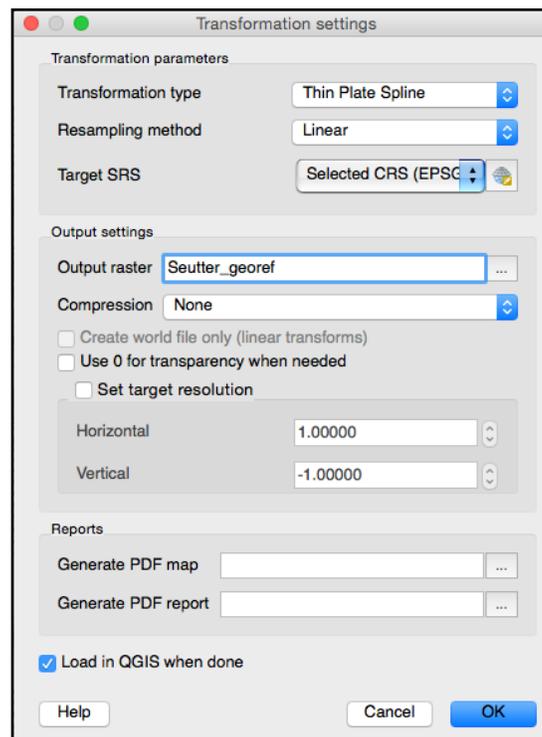


15. Add seven control points.

16. When you are finished, click the green “play” button on the georeferencer window.

17. you will get an “info” message telling you to set the transformation settings. In the new box, select “thin plate spline”, “linear” resampling and make sure the “target SRS” is pseudo Mercator.

18. Under “output raster,” give the new georeferenced map a name and select which folder to save it into. It is good practice to add _georef following the name of your map to differentiate your georeferenced images from others. Make sure “load in QGIS when done” is selected and click ok. The window will minimize.



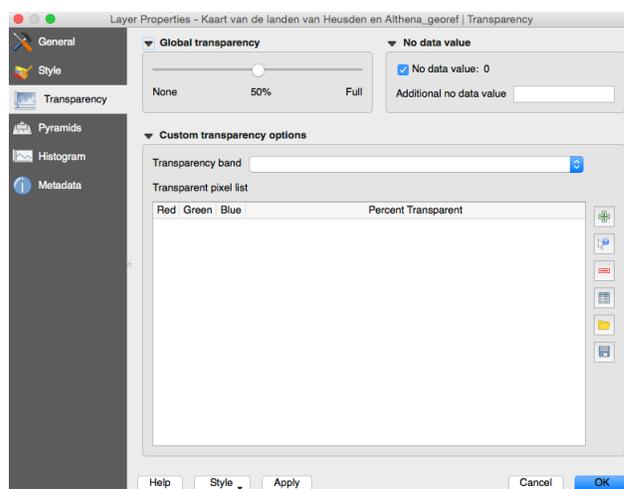
19. Click the free play button to georeference your image and load it as a layer on top of your basemap. Do not exit the georeferencer window. If you are unsatisfied with your control points (perhaps some throw off the rubber sheeting more than others, go back to the window and either add more control points, or delete others using the red “x” button.



20. When you are finished, make sure to save your control points and save the QGIS map.



21. Finally, in order to compare your georeferenced historical raster image with the base map information, you will need to alter the transparency. Under the layers panel, double click your raster image.



Select “transparency” from the left hand bar and set “global transparency to 50%. Click ok.

22. **FOR BLOG:** When you are done, look at the differences between the OpenLayers map background and the georeferenced image you just overlaid. Write two paragraphs to answer the following two questions.

1. How might you use this georeferenced image to uncover new information about the history of the region you just mapped.
2. What are some weaknesses to this approach? Are there inaccuracies? Do some places map better than others? Why?

Georeferencing Tips

- To avoid unnecessary warping and to maintain accuracy, zoom in to specific area on both maps and try to place the points in identical areas as precisely as possible
- Try not to georeference political boundaries, large cities or variable environmental features (i.e. county borders/rivers). Instead, choose features that are geographically discrete and have not likely changed. (smaller towns generally function well)
- Place a **control point** in all of the major regions of the historical map