

Project 2: Digitizing Precinct Maps

Goals:

- Gain hands-on experience working with QGIS's *Georeferencer* and *Digitizing* tools
- Understand how to merge and edit features to create a topologically sound shapefile
- Make some progress on a state that will eventually go onto mggg-states!

Part I: Georeferencing JPG Precinct Maps (45 minutes)

Zoom logistics: Please work independently, but keep Slack open while you work and communicate with your cohort about your progress and any problems you run into. Feel free to Zoom with your cohort and/or message facilitators as necessary.

Georeferencing is the process of providing spatial reference (i.e. coordinates) to raster data. While you can open a map stored as a JPG, TIF, or PNG in QGIS, it will appear wherever you have your map extent zoomed to rather than at the location it's mapping. This is because the image file format you are using has no spatial information encoded into it. You must supply that information through georeferencing.

You will find your county assignment [here](#) along with a link to a Google Drive folder containing JPG maps. We've assigned counties such that folks in the same cohort are working on the same part of a state, and also that folks with more/less GIS experience don't have a county that's too easy or too challenging. Some of the maps are not colorblind friendly. If this is a problem for you, please let Brad know in the Slack and we will provide you with a different county.

Complete the following to get started:

1. Download the *il_counties* shapefile from the [Reference Data](#) folder of the Google Drive. Open it in a new QGIS project.
2. Check your project's CRS in the bottom right corner. It should be **NAD83: UTM Zone 16N (EPSG:26916)**. If it's not, make sure to change your project to use EPSG:26916.
3. In your top menu bar, go to *Plugins -> Manage and Install Plugins...* and search for "Georeferencer GDAL" and "QuickMapServices" in all plugins. If they are not already installed, make sure to install them. You can tell if a plugin is installed because it will have a blue checkmark next to it. Go to *Web -> QuickMapServices -> OSM -> OSM Standard* in the menu bar. This will add an OpenStreetMap basemap to your project. If you then go to the *Raster* dropdown menu in the menu bar, Georeferencer should now be an option. Clicking on it will raise the Georeferencer window.
4. Save your project!

Then, read the rest of this section and then begin georeferencing. Most of the instructions you'll need are in Section 1 of the [Annotated Digitizing Guide](#). Feel free to refer also to yesterday's Introduction to Digitizing, Georeferencing and Topology videos.

When georeferencing, keep the following things in mind:

- *Make sure you are using the appropriate projection. If your georeferenced map of an Illinois county shows up in the middle of the Atlantic Ocean (or somewhere else that is not Illinois), this is undoubtedly a projection problem. Double check that you've correctly specified your projection in both your project and the Georeferencer.*
- *Don't use water bodies as your reference points. Rivers and lakes change over time and are not necessarily reliable (particularly with older maps).*
- *Use at least 4-5 reference points to ensure accuracy and try to get points in each of the map's four corners.*
- *Check to see how your georeferenced map aligns with the basemap by adjusting the georeferenced map's transparency and toggling it on and off. If it doesn't align well you can go back into your Georeferencer window and edit/add reference points or change your Transformation Settings.*
- *Use a different Transformation Type in the Transformation Settings if necessary. Sometimes the Linear Transformation Type doesn't produce the best results. In particular, if you are noticing red lines next to your points on your JPG map, try using Thin Plate Spline instead.*
- **Save your work regularly** in case QGIS crashes!

Once you are done, upload the georeferenced map/s to the **Georeferenced** subfolder in your county's folder in the Google Drive.

If you finish early, move onto Part III. If by 11:30 you have not finished georeferencing all of your maps, don't worry. Move onto the next part of the project anyway and vectorize the maps you have finished. Counties will take varying amounts of time to complete based on how many maps there are and their quality.

Part II: Cohort Check-ins (30 minutes)

Zoom logistics: meet with your cohort to discuss your progress georeferencing . You don't need to stay in the breakout room for the whole half hour, but do stay until you've talked through the below questions and checked in with a facilitator, who will be rotating through the rooms.

In breakout rooms, discuss the following:


1. What did your maps look like? Were they in color or black and white? Were there hand-drawn elements or do they look like they were made completely digitally?
2. Did the street names in your maps match the OpenStreetMap basemap? If not, how did you handle that?

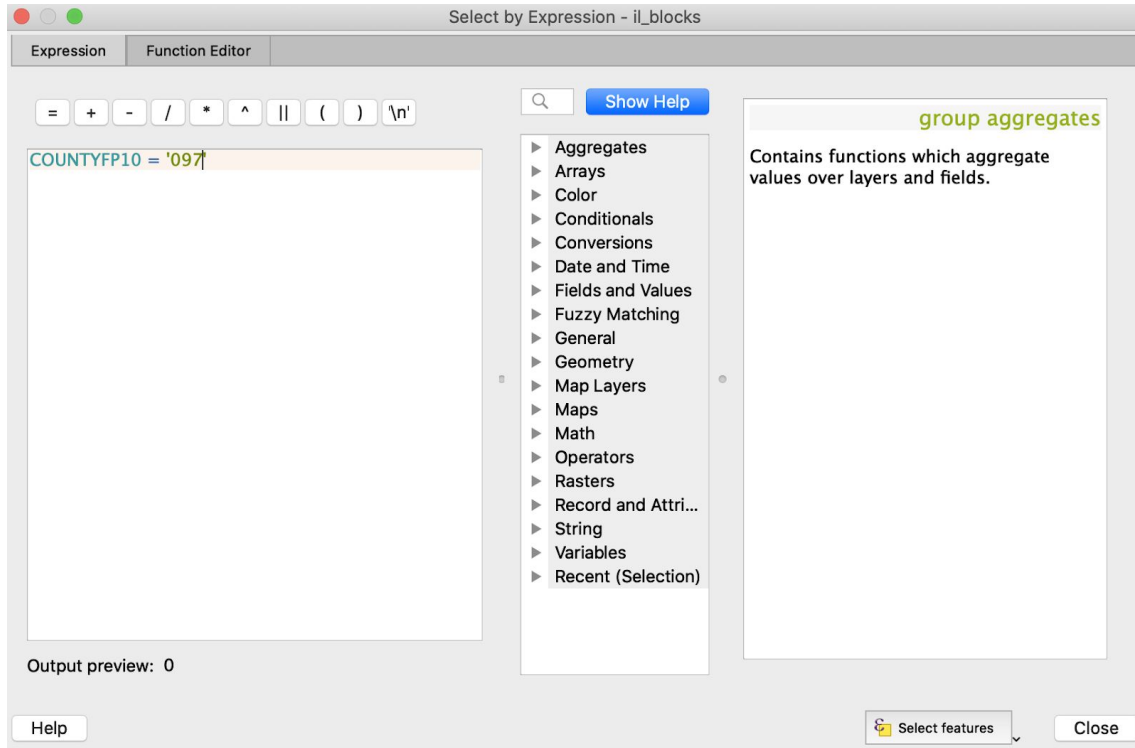
3. Given the quality of your precinct maps, are there any challenges you anticipate in the vectorizing process? Do you have any ideas about how you might approach them?

Part III: Vectorizing (2 hours 45 minutes)

Zoom logistics: Please work independently, but keep Slack open while you work and communicate with your cohort about your progress and any problems you run into. Feel free to Zoom with your cohort and/or message facilitators as necessary.

In this section, you'll be going back and forth between the Annotated Digitizing Guide and these instructions. We'll point you to specific points in the guide, but otherwise follow the instructions below.

1. Open your QGIS digitizing project from earlier.
2. Set up your plugins: In your top menu bar, go to *Plugins -> Manage and Install Plugins...* and search for "Digitizing Tools" in all plugins. Install it. Then, go to *View -> Toolbars* and make sure both *Digitizing Tools* and *DigitizingTools* are checked.
3. In the **Reference Data** folder of the Google Drive, there is a shapefile *il_blocks* of Illinois's census blocks. Open it in your QGIS digitizing project. Open the block shapefile's attribute table. There are over 450,000 census blocks in Illinois so it may take a moment to load.
4. Once the attribute table has loaded, click "Select features using an expression" (see icon to the right) from the toolbar. 
5. Write a query in the pop-up window to select only the census blocks in your county using the county FIPS code. Below is an example for Lake county, IL. Replace Lake county's FIPS code with your county's. You can look up the FIPS code for every county in Illinois either using the 'COUNTYFP' column of the *il_counties* shapefile or on [this Wikipedia page](#).



6. Exit out of the *il_blocks* attribute table and click on the “Zoom to Selection” button (next to the “Zoom to Full Extent” button) to view your selection.



7. Right click (or control click if you’re a Mac user) on *il_blocks* in the Layer menu. From the resulting dropdown menu go to *Export -> Save Selected Features As...* Save the blocks for your county as a shapefile called *countyname_precincts* (replace *countyname* with your county’s name). We will later merge the census blocks in this shapefile to form precincts. Be sure to specify **NAD83/UTM zone 16N (EPSG:26916)** as the new shapefile’s CRS. Once your new shapefile loads, remove *il_blocks* from your project.
8. Follow the instructions from pages 23-27 (stopping at step 8) of the Annotated Digitizing Guide to select census blocks to form a precinct.

9. Once you have reached step 8 on page 27 and are satisfied with your work, toggle on editing for your layer.



10. Go to *Edit -> Merge Selected Features*. In the resulting pop-up window, scroll to the bottom of the list of features until you reach the one that says “Merge” rather than having an index number. Manually change the contents of the “NAME” column to your precinct name from the georeferenced map (ex: Precinct 1). Then click “Ok.” Save your work by clicking the Save icon next to the Edit icon.

11. Follow this procedure for the remainder of the precincts. When you've finished, there shouldn't be any remaining census blocks. Check the attribute table to see if you missed any blocks and if so, merge them into the appropriate precinct.

12. If you did not finish your georeferencing and have vectorized all your precincts for the maps you did georeference before the end of the day, return to georeferencing your unfinished maps. If you finish your county early, contact Brad and he will provide you with another. Upload your completed precinct shapefile to the **SH**P subfolder of your county's Google Drive folder. If you don't finish, we'll return to digitizing later, and/or just be in touch with us -- some of these counties are definitely more work than others!