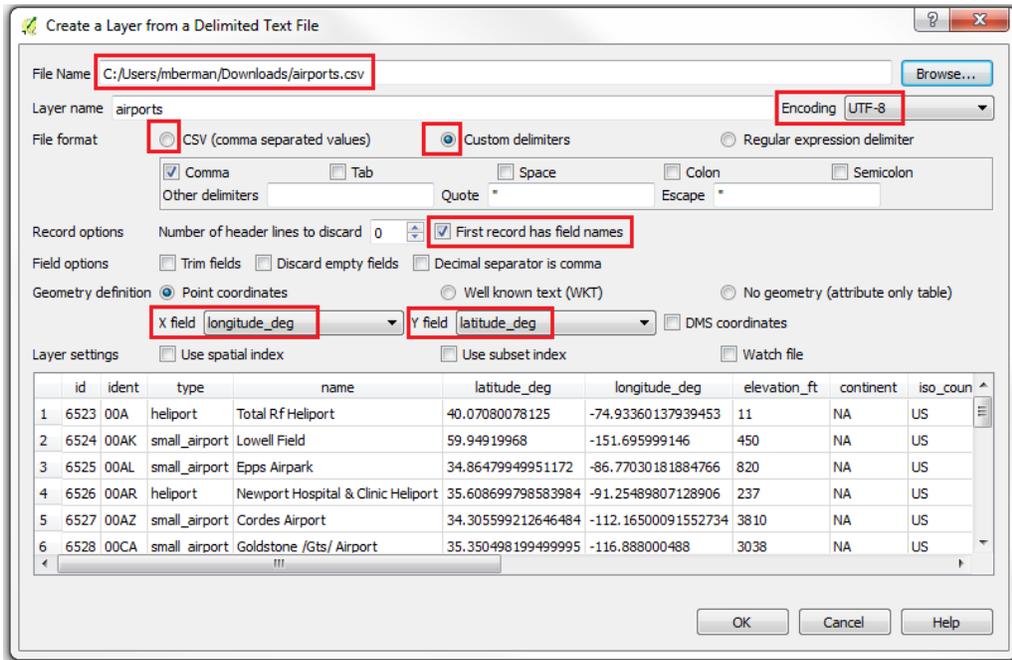


Module 2: Thematic Mapping with Point in Polygon Query

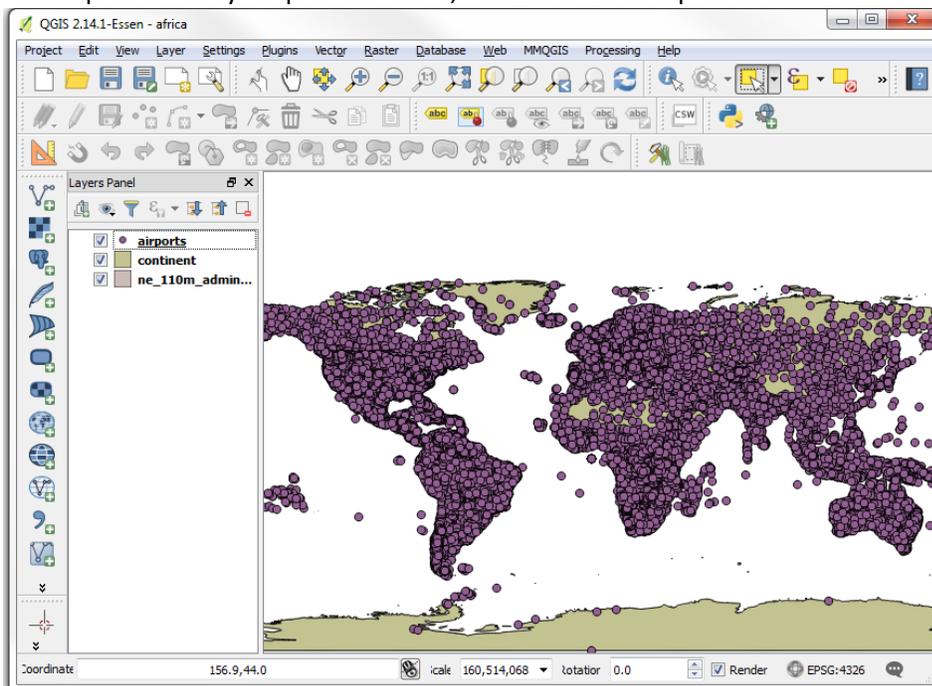
Tutorial by Lex Berman

This goal of this exercise is learn how to import tabular data to QGIS, to run spatial selections, point in polygon analysis, and to create thematic maps, as well as areal calculations for thematic maps.

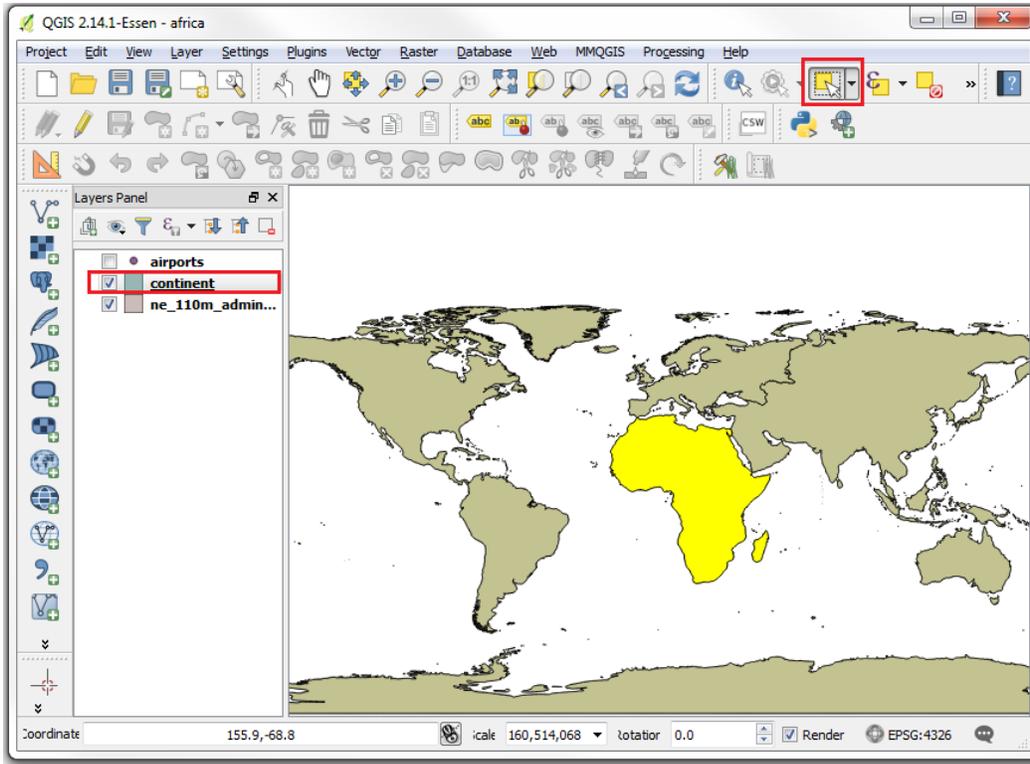
1. Data Source <http://ourairports.com/data/>
2. Open .csv in QGIS using add vector csv



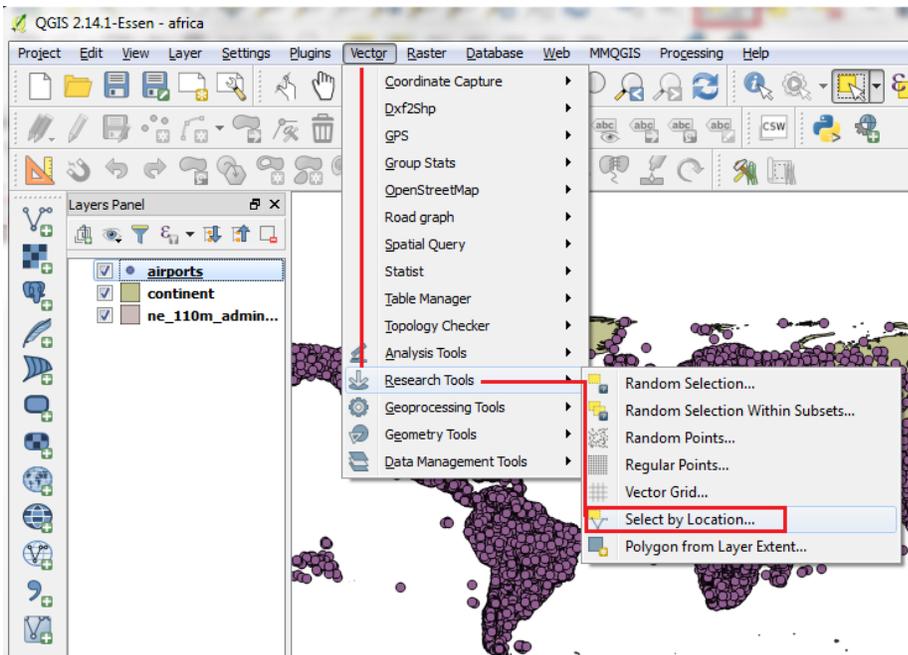
3. Airports .csv layer opens in buffer, SAVE AS NEW "airports" SHAPEFILE LAYER , and CLOSE .csv file!



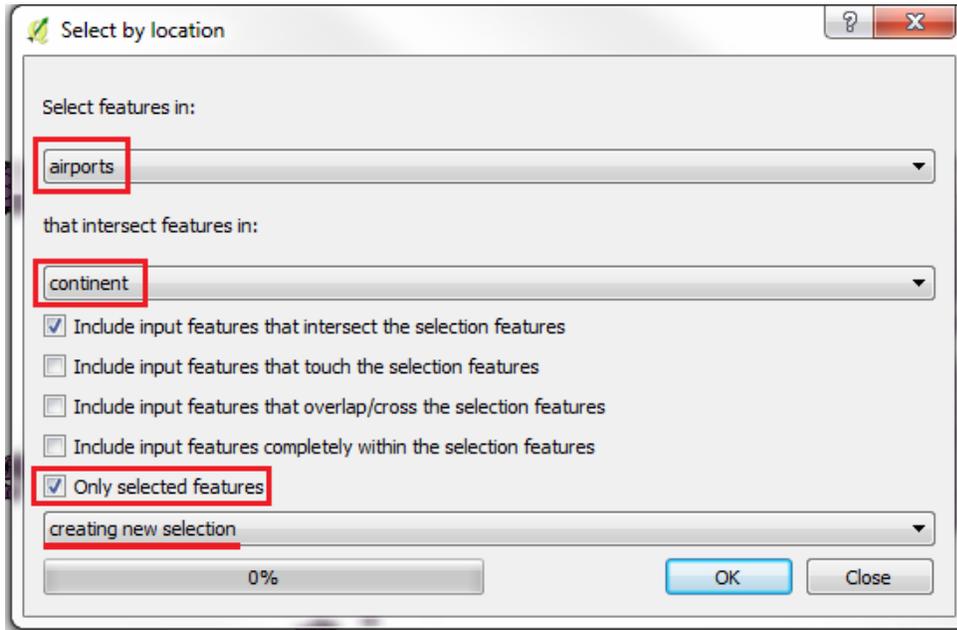
4. turn off visibility of airports layer, then make continents layer ACTIVE, use SELECT tool to select Africa



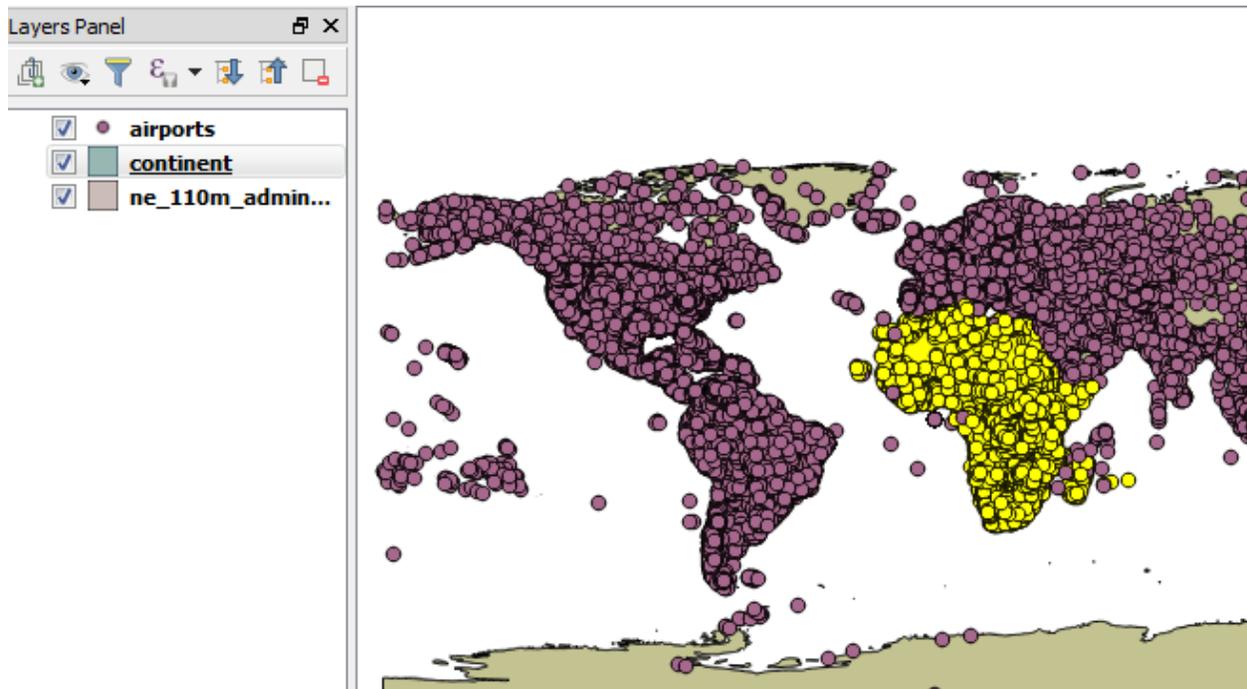
5. use VECTOR | RESEARCH TOOLS | SELECT BY LOCATION



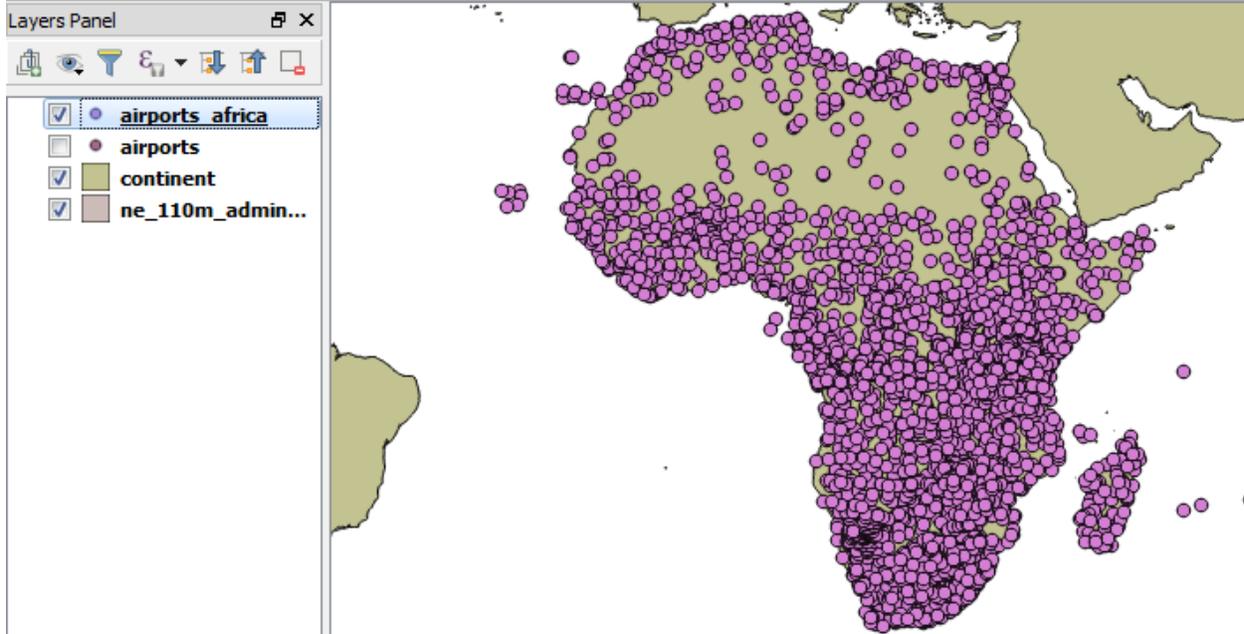
6. In the dialog, Select features in “airports” the intersect features in “continents” and make sure that there is a TICK in the box for ONLY SELECTED FEATURES, as “creating new selection” before hitting OK



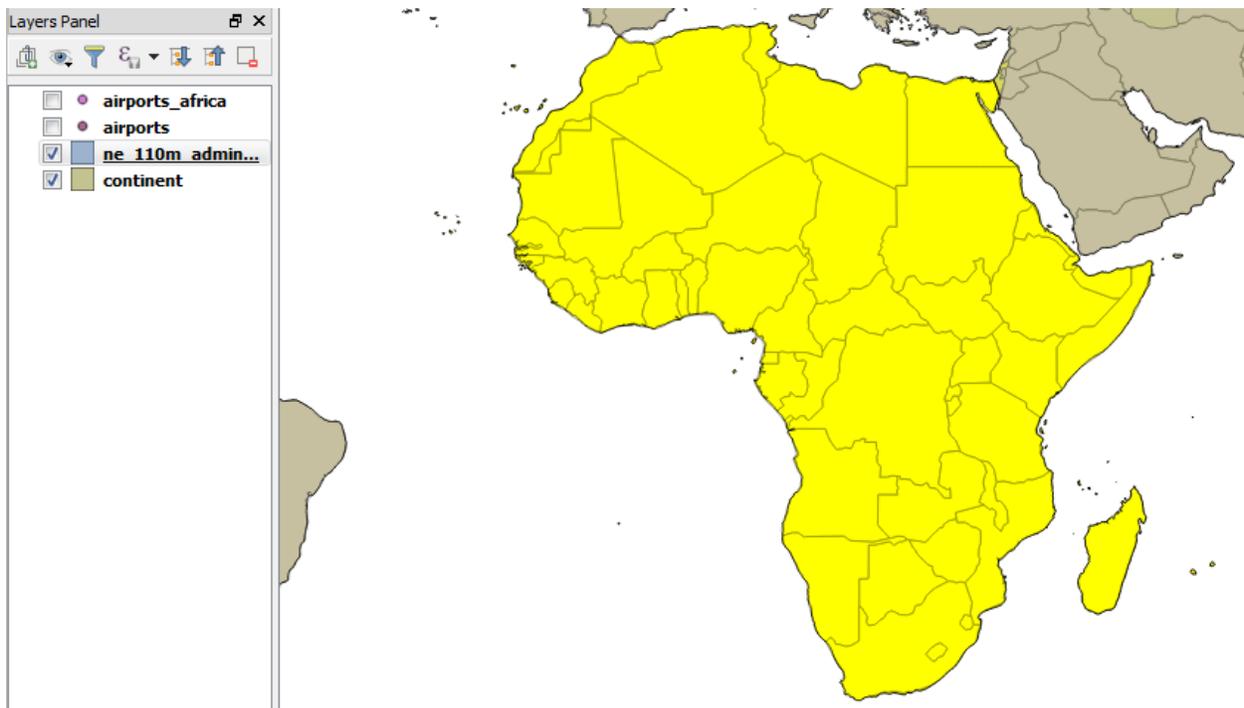
7. airports that intersect continents selection will be chosen, SAVE THE SELECTED airports to new shapefile, making sure to tick the SAVE ONLY SELECTED FEATURES option!



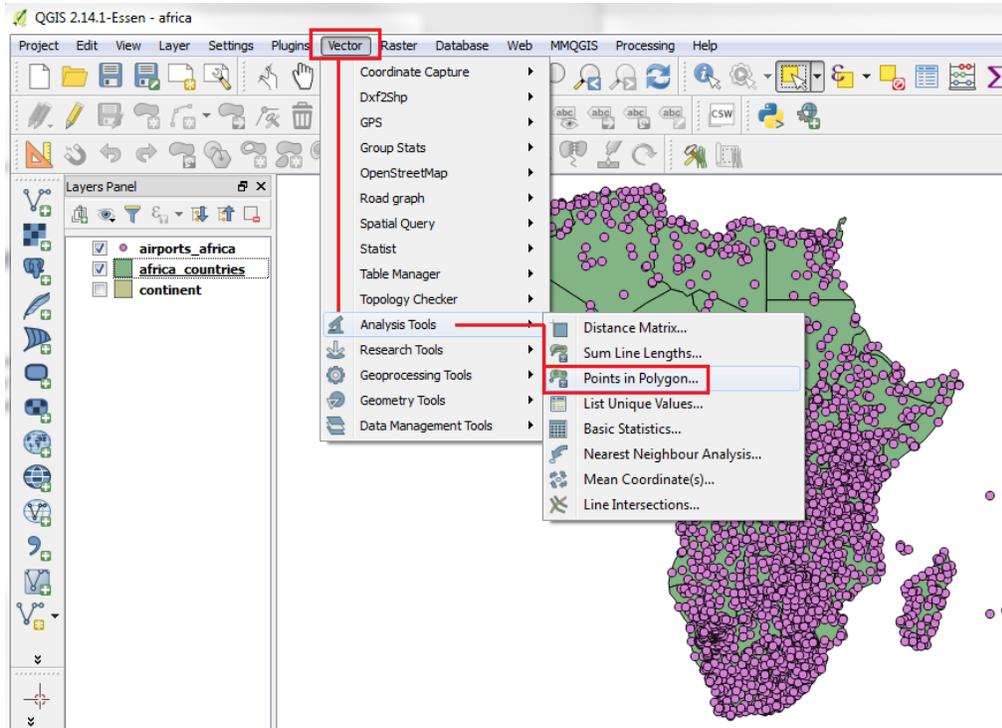
8. now Deselect Features in All Layers, and turn off visibility of original airports layer. Zoom to layer



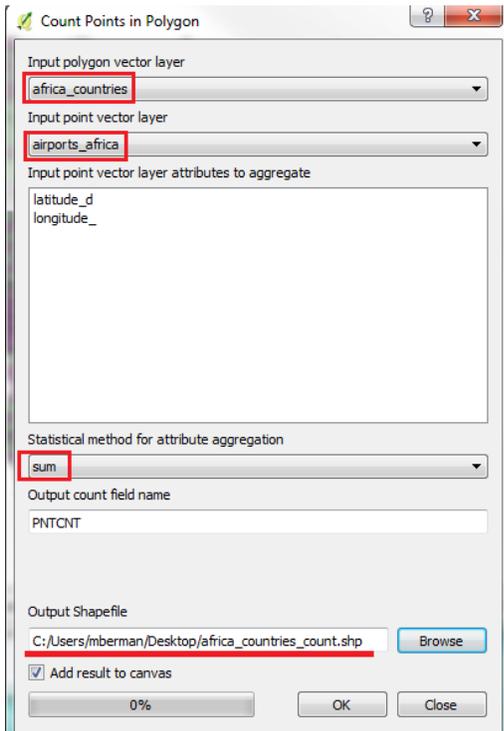
9. Turn off the airports layers, and make continents active, the select AFRICA again. Now use SELECT BY LOCATION to select features in Natural Earth Countries that intersect with the continents selection. The result should be only the countries that intersect with the continent of Africa. Be sure to SAVE THE SELECTION countries by right clicking the ne_100_admin layer and SAVE AS a new shapefile before continuing.



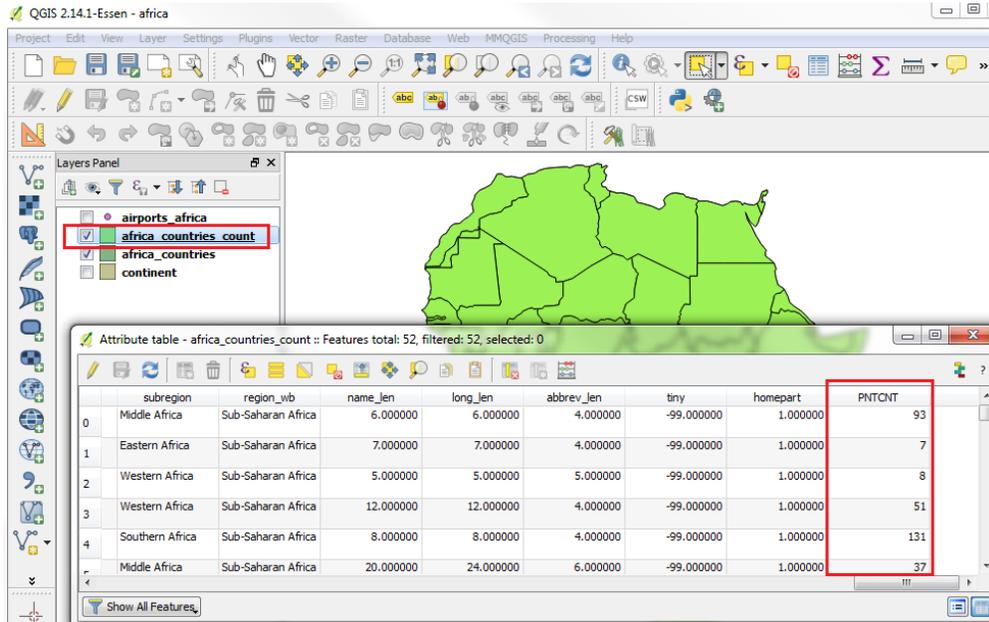
10. Turn off the Continent layer and the ne_110_admin layer, then we can proceed to VECTOR | ANALYSIS | POINTS IN POLYGON step



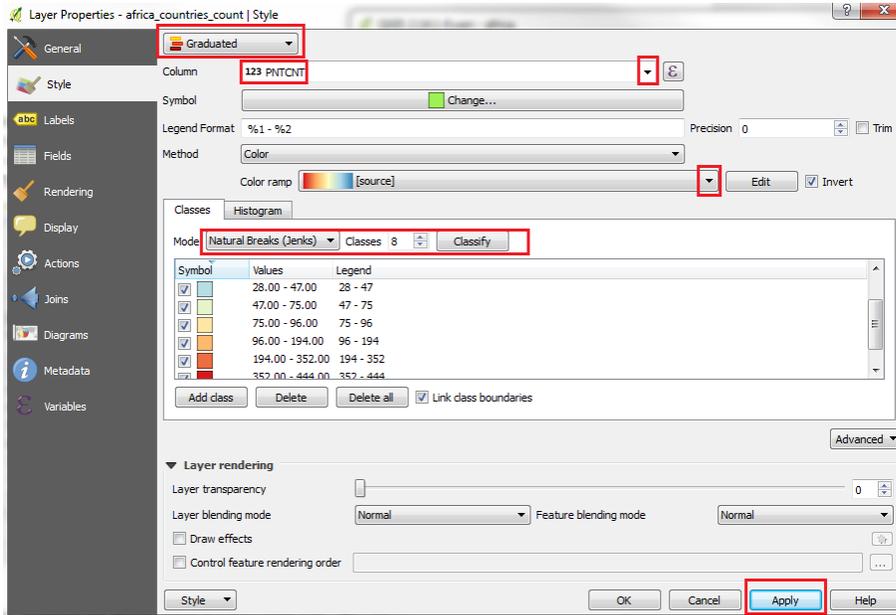
11. Set input polygons = Africa_countries, input points = airports Africa, statistical method = sum



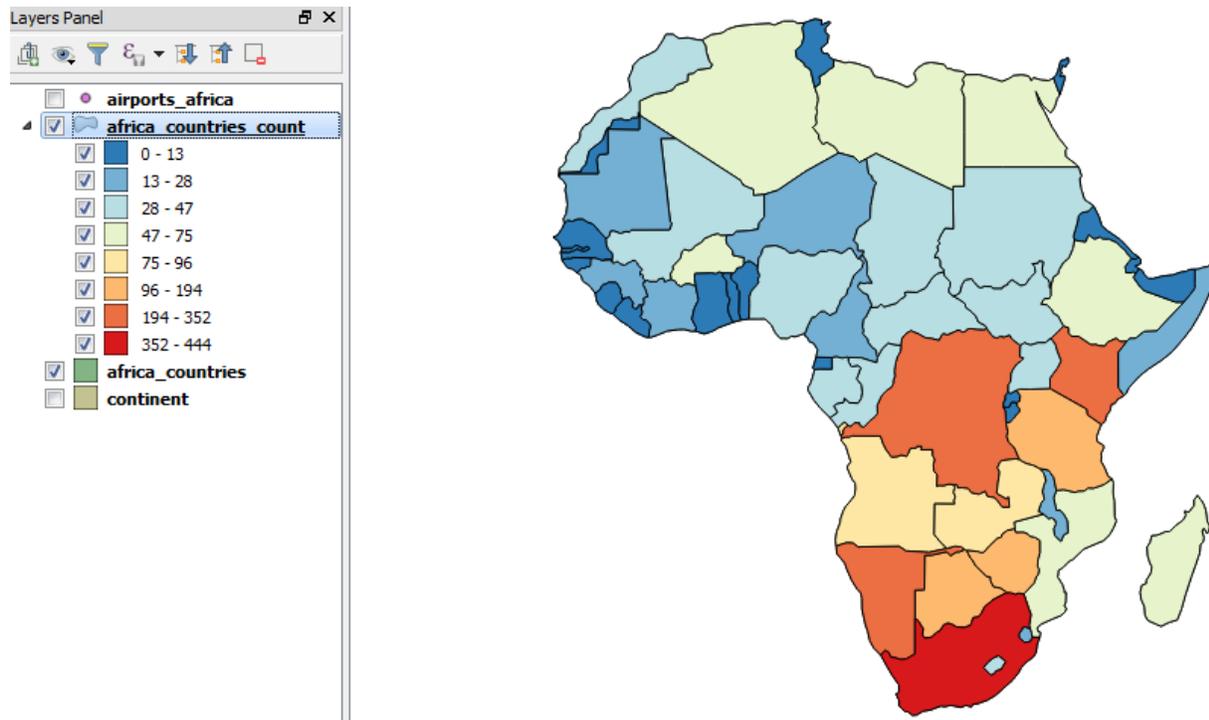
Note that the SUM will take the number of points that falls within each polygon and add the sum of those point features as an integer into a new column, called “PNTCNT” in your output shapefile. In this example, we accept the default field name “PNTCNT” and will write to a file called “Africa_countries_count.shp” on the Desktop.



12. Symbolize the PNTCNT values in a choropleth map. Right-click on the the layer with PNTCNT field and go the PROPERTIES | STYLE tab. Change the setting from SINGLE SYMBOL to GRADUATED COLOR, then pick the column containing the values, PNTCNT from the drop-down menu of columns. Choose a color ramp, and the Classification Mode, number of classes, and hit CLASSIFY if it does not auto-update the preview. Hit APPLY to apply the changes on the map view, and OK to close the dialog.

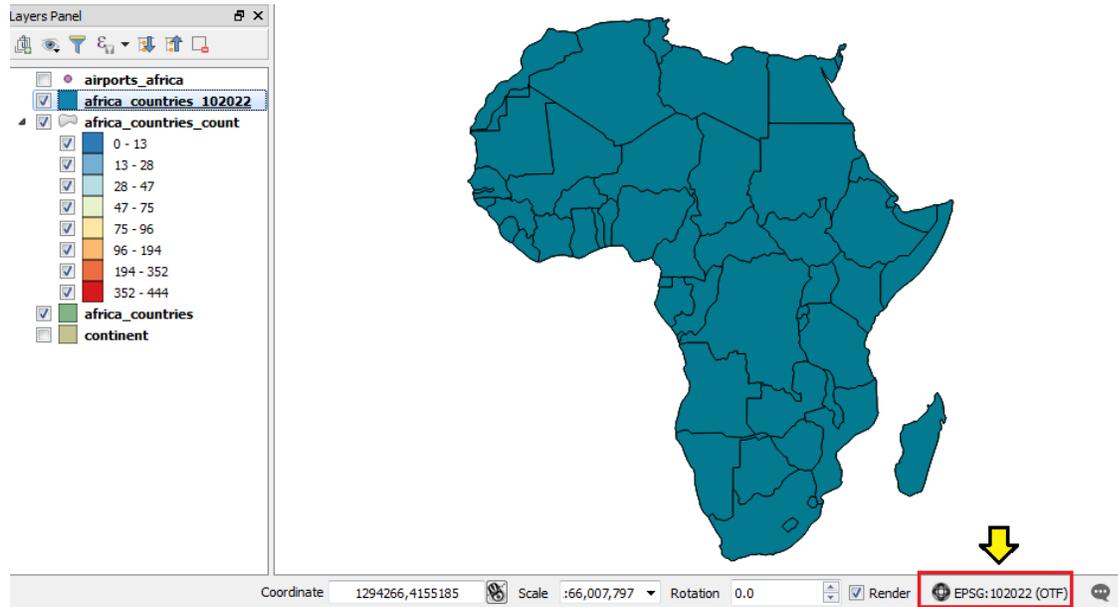


13. Depending on your symbolization selections, the choropleth map will reflect the total number of airports in each country. Here using Natural Breaks, 8 classes, inverted RdYlBu (red yellow blue) ramp.

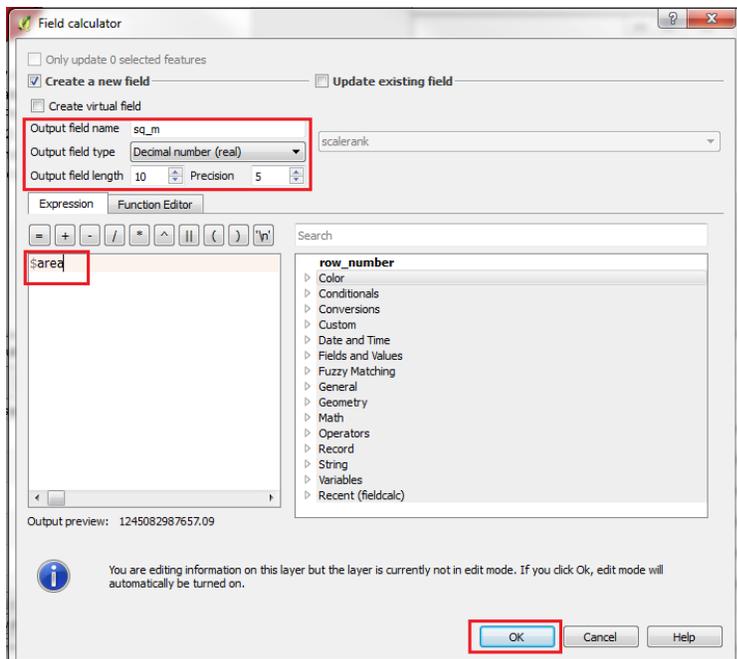


14. In order to calculate the number of airports PER SQUARE KM of each country, we must first REPROJECT the CRS of the Africa Countries Count layer to a “real-world” coordinate system. The current standard global project of WGS-84 is in decimal degrees. We need to SAVE AS a Projected Coordinate System, such as “Africa Albers Equal Area Conic” which has EPSG Number 102022. After saving this

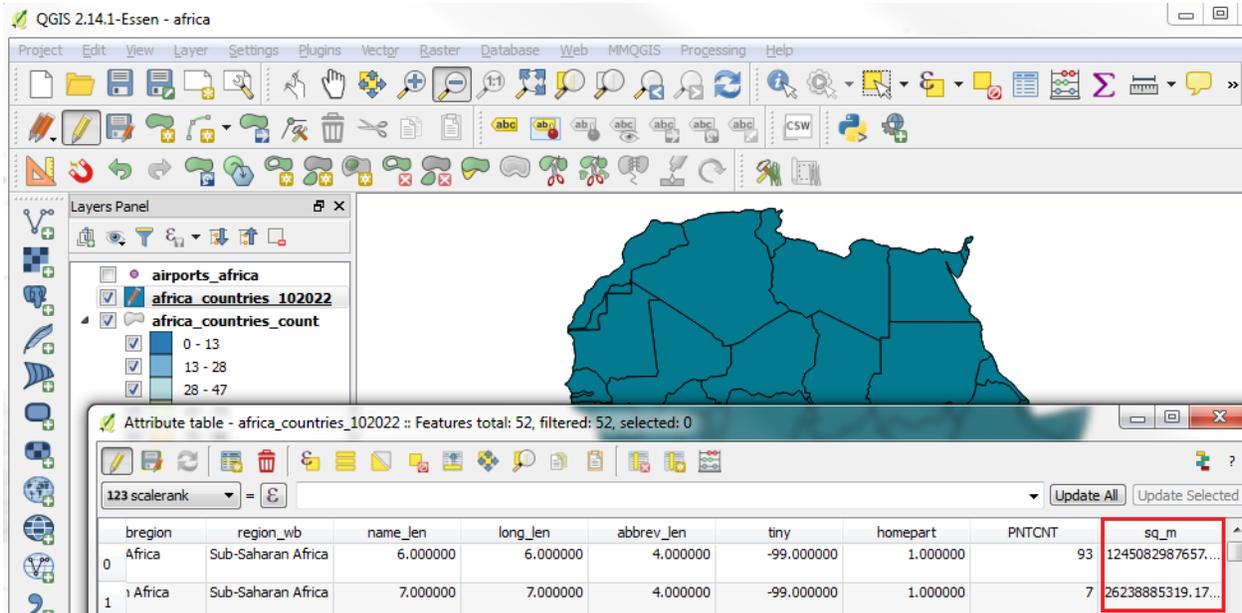
layer with a new name, you need to RESET the PROJECT | PROPERTIES | CRS to that projection, and make sure that the correct EPSG Number is shown on the lower right for the current project.



15. Since the Albers 102022 projection is in units of Meters, we will first create a new field with Square Meters. Open the Attribute Table, then Field Calculator, New Field (named “sq_m”), field type = decimal number (real), field length 20, precision 5, then in the expression form type \$area, and OK



16. Check the new column containing the area for each polygon in square meters (the projection units)



17. Now we can repeat the field calculator step to create a field containing Square Km. From the Attribute Table, go to Field Calculator, New Field (named "sq_km"), field type = decimal number (real), field length 20, precision 5, then in the expression form type the name of the field in double quotes and divide it by 1,000,000. The expression, in this case, looks like this: ["sq_m" / 1000000]. Now you should have figures, such as 26,238 sq_km for Burundi. Toggle the editor to save the edits.

18. We can now calculate a new column, which will "normalize" our raw count of airports for each country by the area in square km for each country. This will give us airports per sq km. To do this we return to to Field Calculator, New Field (named "airp_sqkm"), field type = decimal number (real), field length 20, precision 10, then in the expression form divide the PNTCNT field by sq_km field. The expression, in this case, looks like this: ["PNTCNT" / "sq_km"]. This will be a very small number (so we need 10 places past the decimal in precision). Save the edits.

19. Finally, we can use the newly calculated field to generate a choropleth map of airports per sq km. Even using exactly the same Style [graduated, Natural Breaks, 8 classes, RdYIBu inverted ramp], the difference between the raw count of airports per country map, and the number of airports per sq km map is striking! Cartography is an interpretive art form, depending on how you normalize and how you classify the data.

