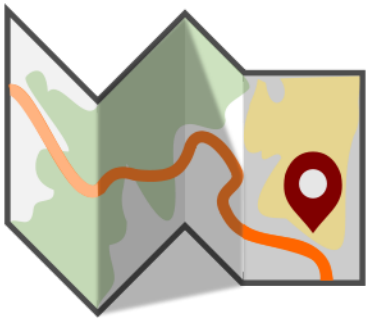
Points in Polygon Analysis

QGIS Tutorials and Tips



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Points in Polygon Analysis

The power of GIS lies in analysing multiple data sources together. Often the answer you are seeking lies in many different layers and you need to do some analysis to extract and compile this information. One such type of analysis is **Points-in-Polygon**. When you have a polygon layer and a point layer - and want to know how many or which of the points fall within the bounds of each polygon, you can use this method of analysis.

Overview of the task

Given the locations of all known significant earthquakes, we will try to find out which country has had the highest number of earthquakes.

Get the data

We will use NOAA's National Geophysical Data Center's Significant Earthquake Database as our layer represenging all major earthquakes. Download the tab-delimited earthquake data.

Natural Earth has Admin 0 - Countries dataset. Download the countries

For convenience, you may directly download a copy of the dataset from the link below:

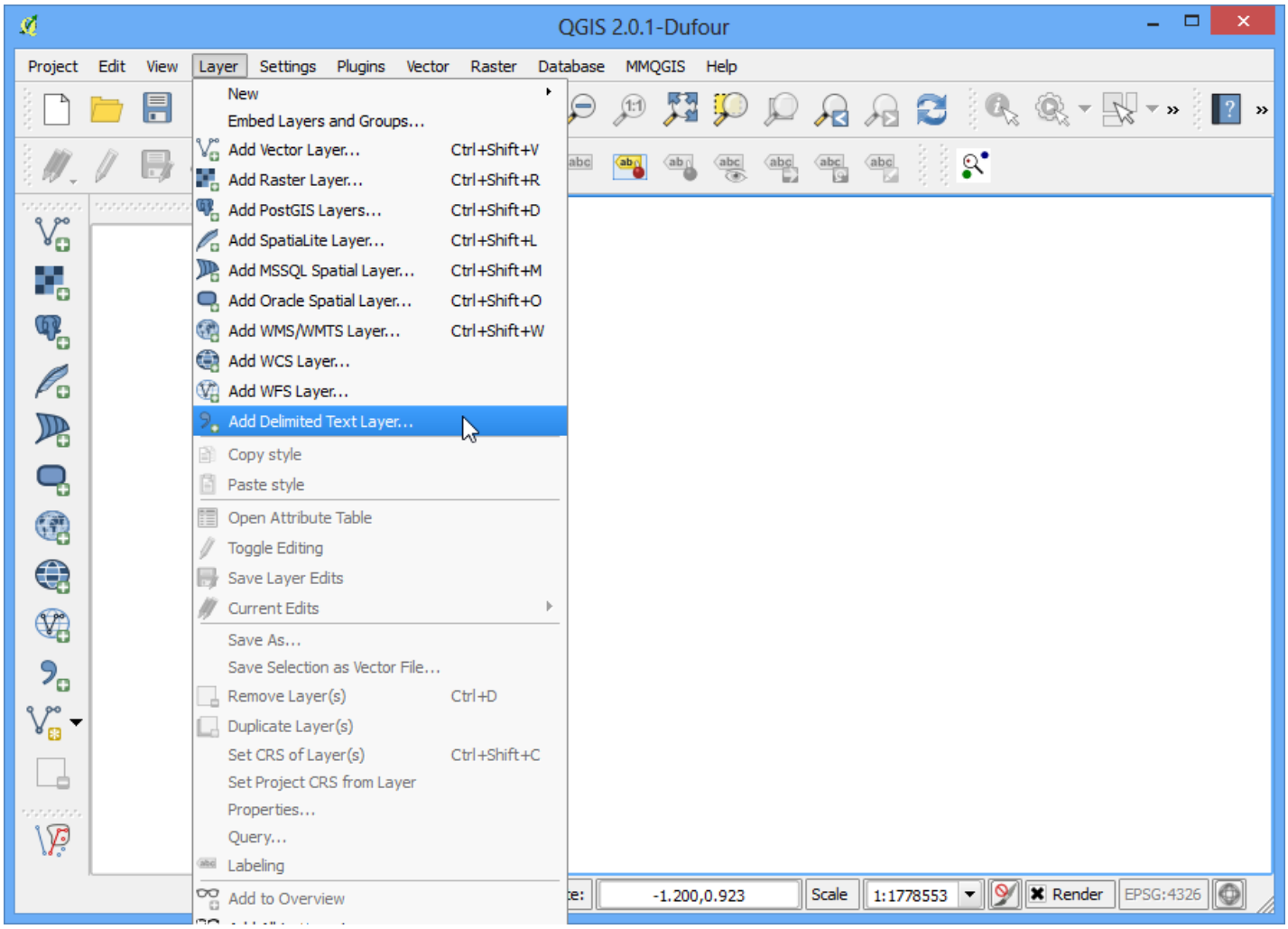
signif.txt

ne_10m_admin_0_countries.zip

Data Sources: [NGDC] [NATURALEARTH]

Procedure

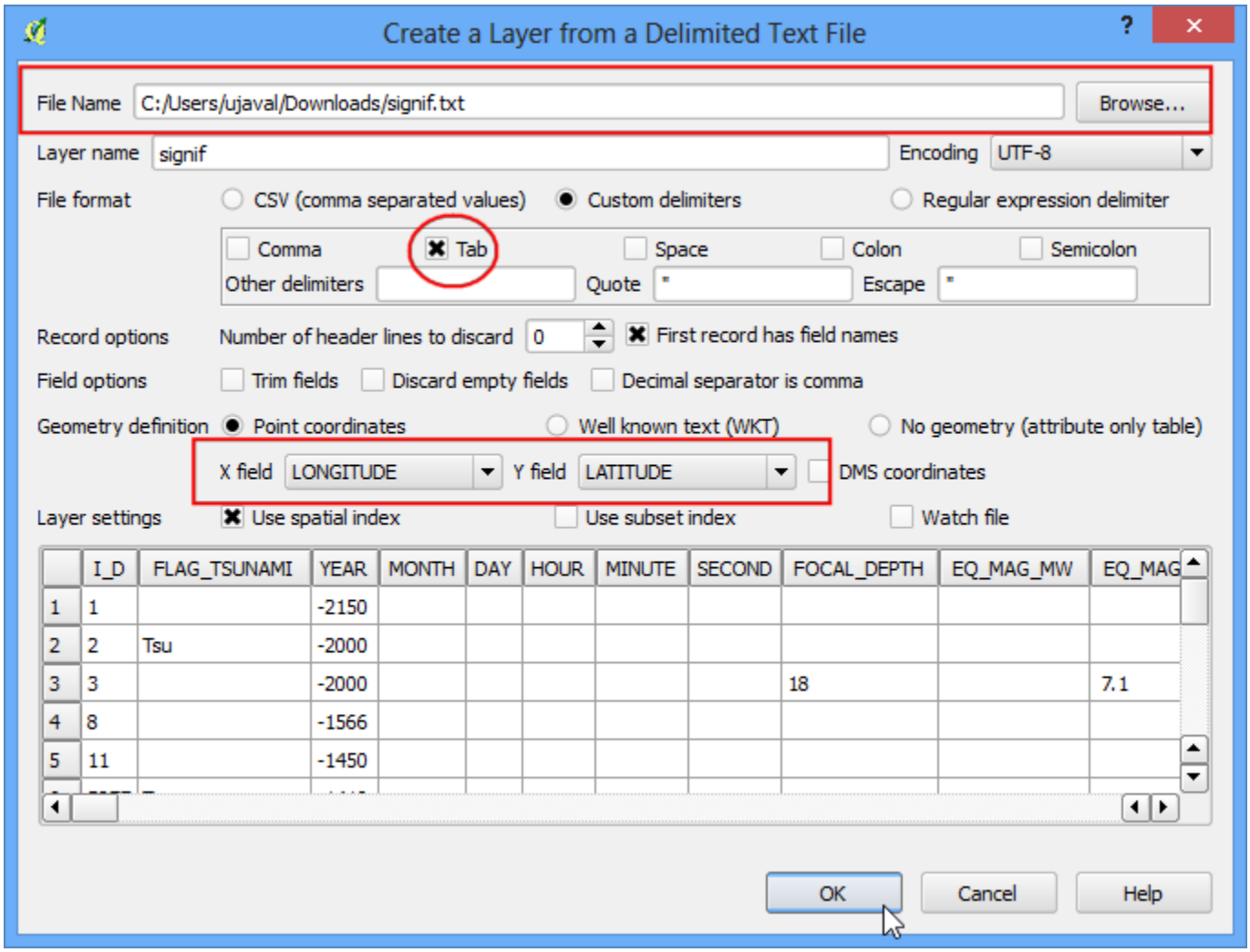
1. Open Layer ▸ Add Delimited Text Layer and browse to the downloaded `signif.txt` file.



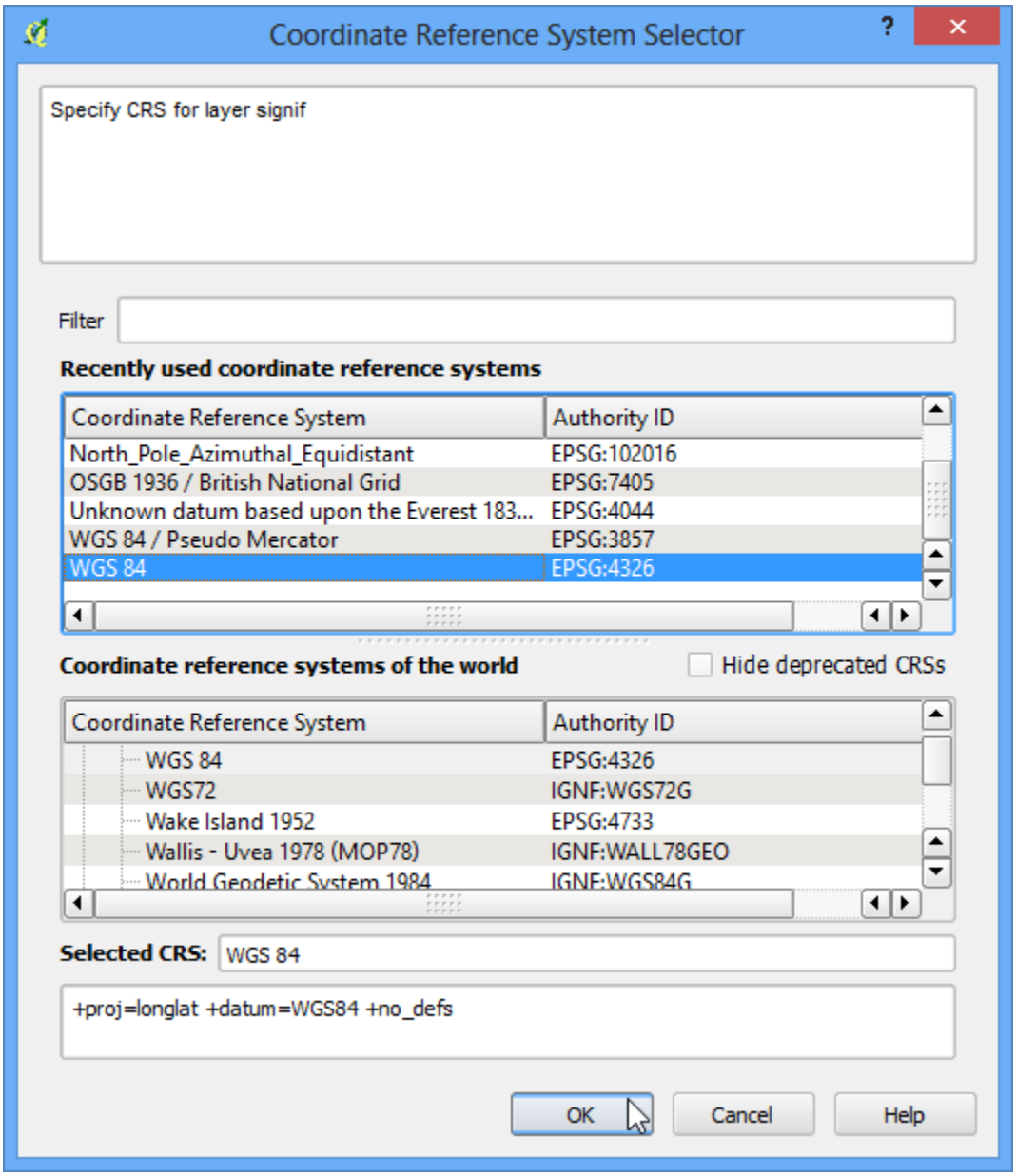
2. Since this is a *tab-delimited file*, choose Tab as the File format. The X field and Y field would be auto-populated. Click OK.

Note

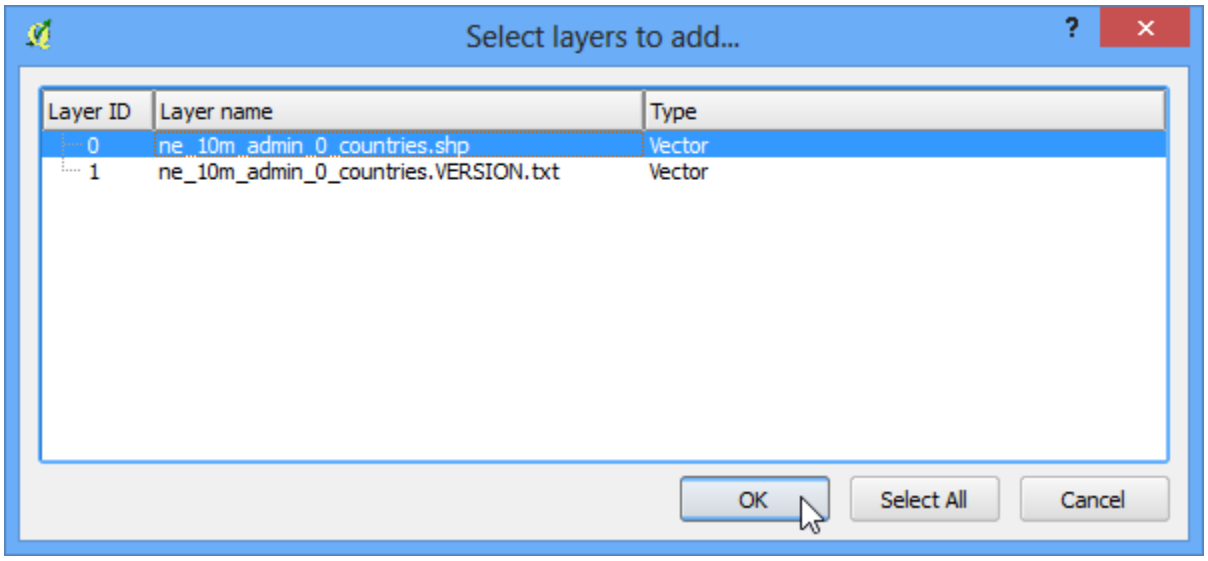
You may see some error messages as QGIS tries to import the file. These are valid errors and some rows from the file will not be imported. You can ignore the errors for the purpose of this tutorial.



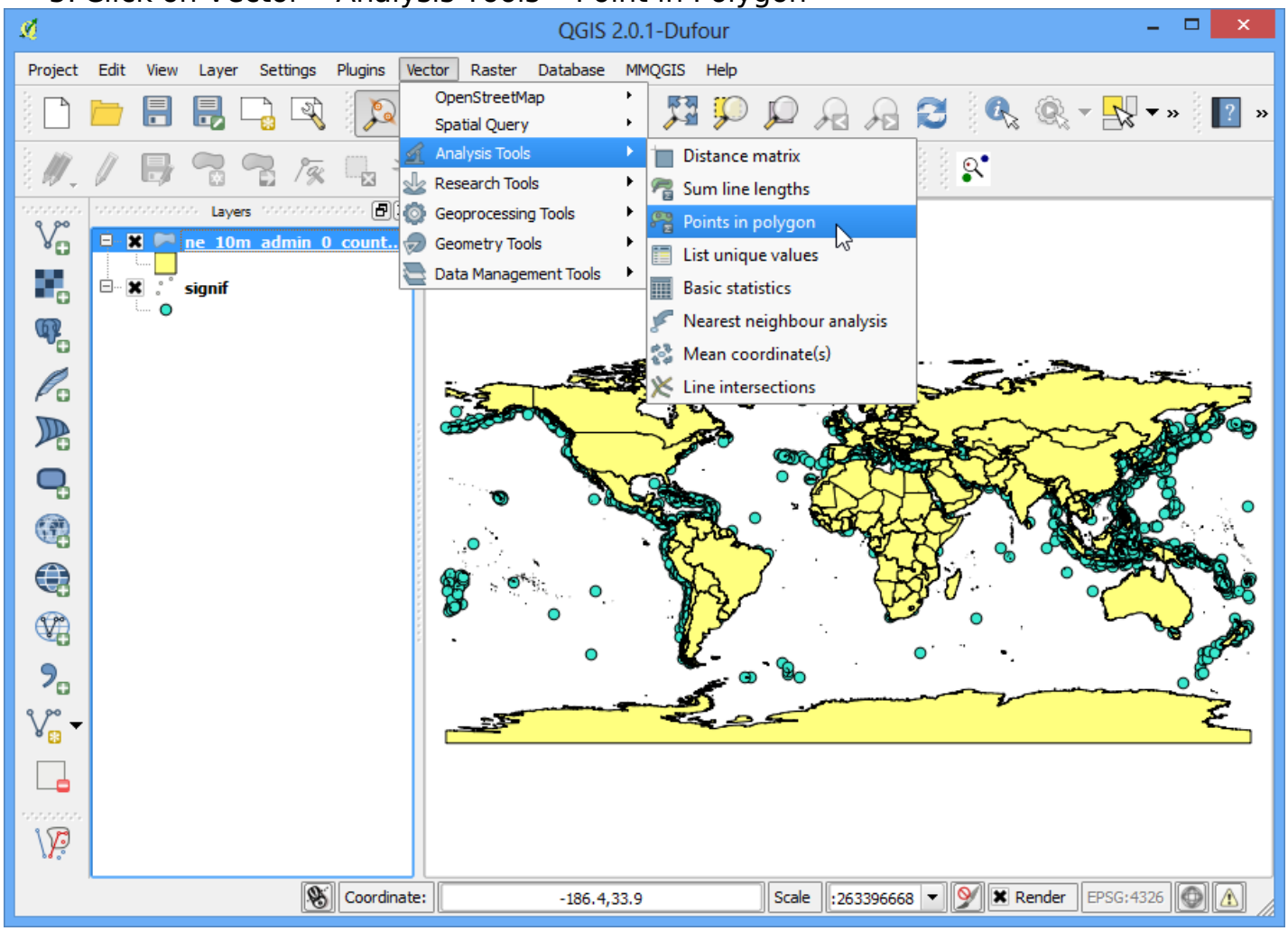
3. As the earthquake dataset has Latitude/Longitude coordinates, choose WGS 84 EPSG:436 as the CRS in the Coordinate Reference System Selector dialog.



4. The earthquake point layer would now be loaded and displayed in QGIS. Let's also open the Countries layer. Go to Layer ▸ Add Vector Layer. Browse to the downloaded `ne_10m_admin_0_countries.zip` file and click Open. Select the `ne_10m_admin_0_countries.shp` as the layer in the Select layers to add... dialog.



5. Click on Vector ▸ Analysis Tools ▸ Point in Polygon

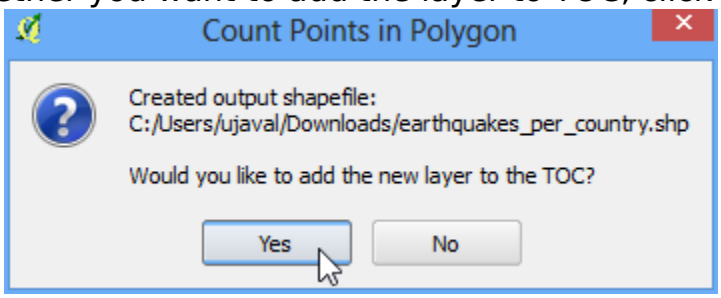


6. In the pop-up window, select the polygon layer and point layer respectively. Name the output layer as `earthquake_per_coutry.shp` and Click OK.

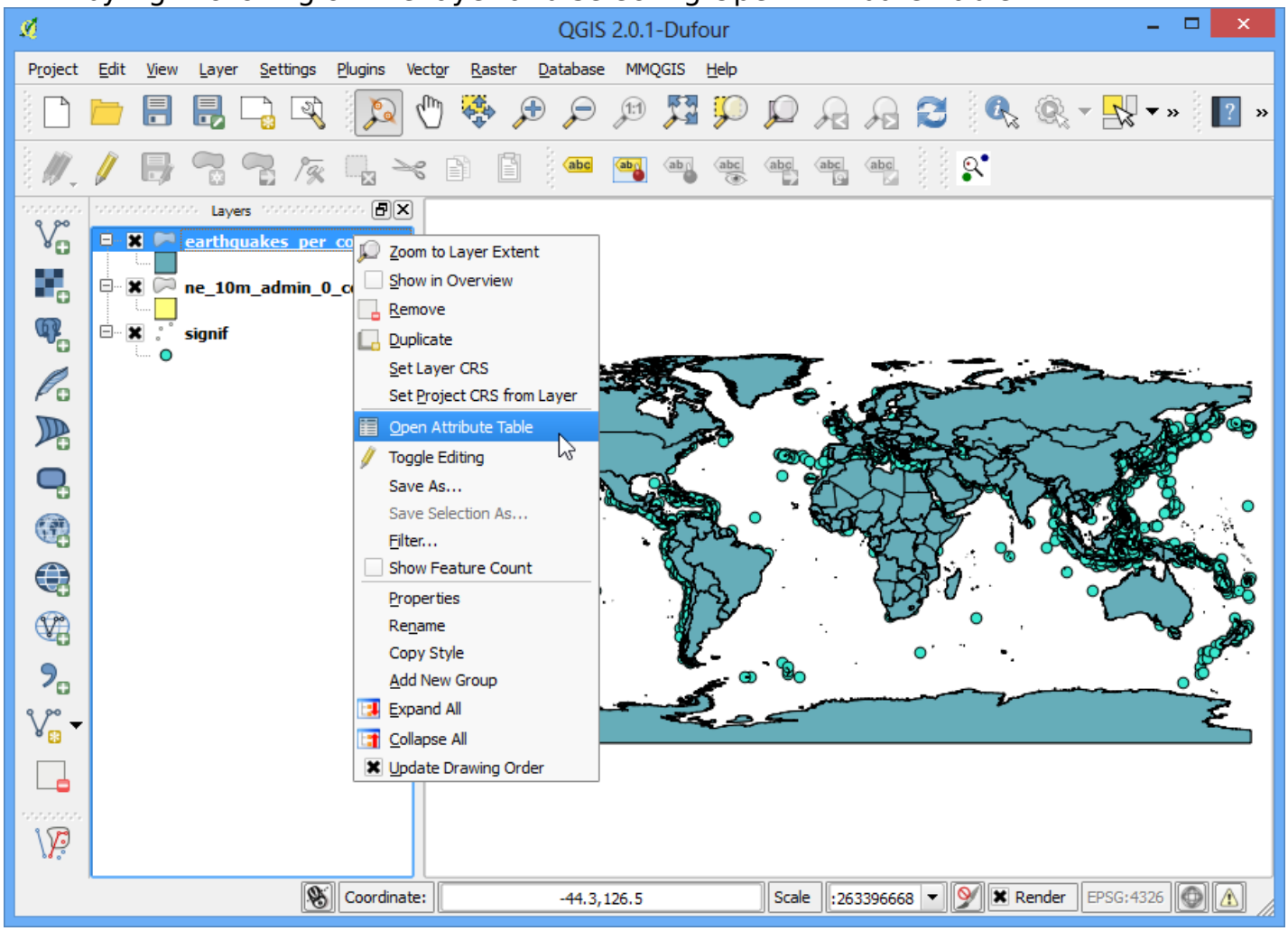
Note

Be patient after clicking OK, QGIS may take upto 10 minutes to calculate the results.

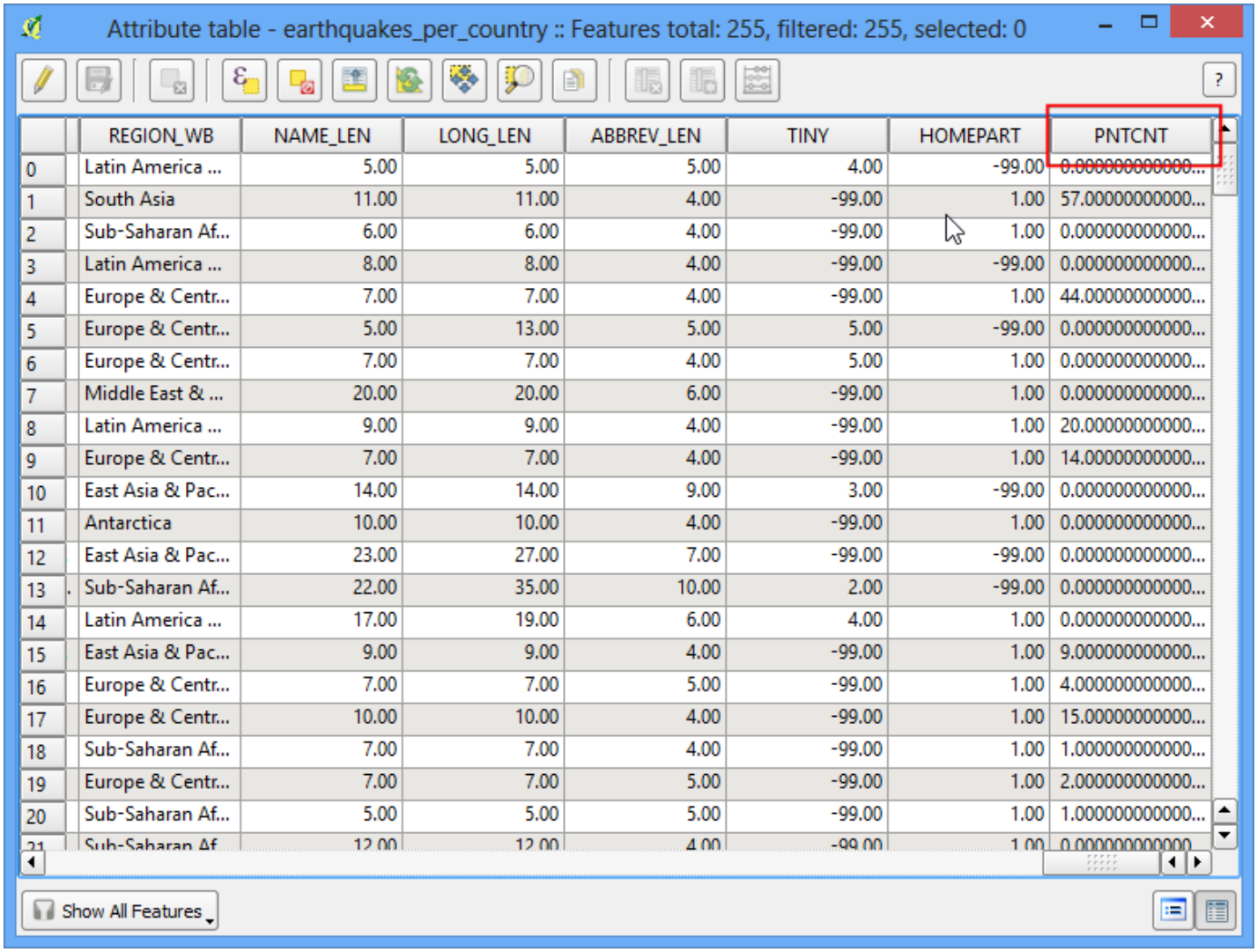
7. When asked whether you want to add the layer to TOC, click Yes.



8. You will see a new layer is added to the table of content. Open the attribute table by right-clicking on the layer and selecting Open Attribute Table.

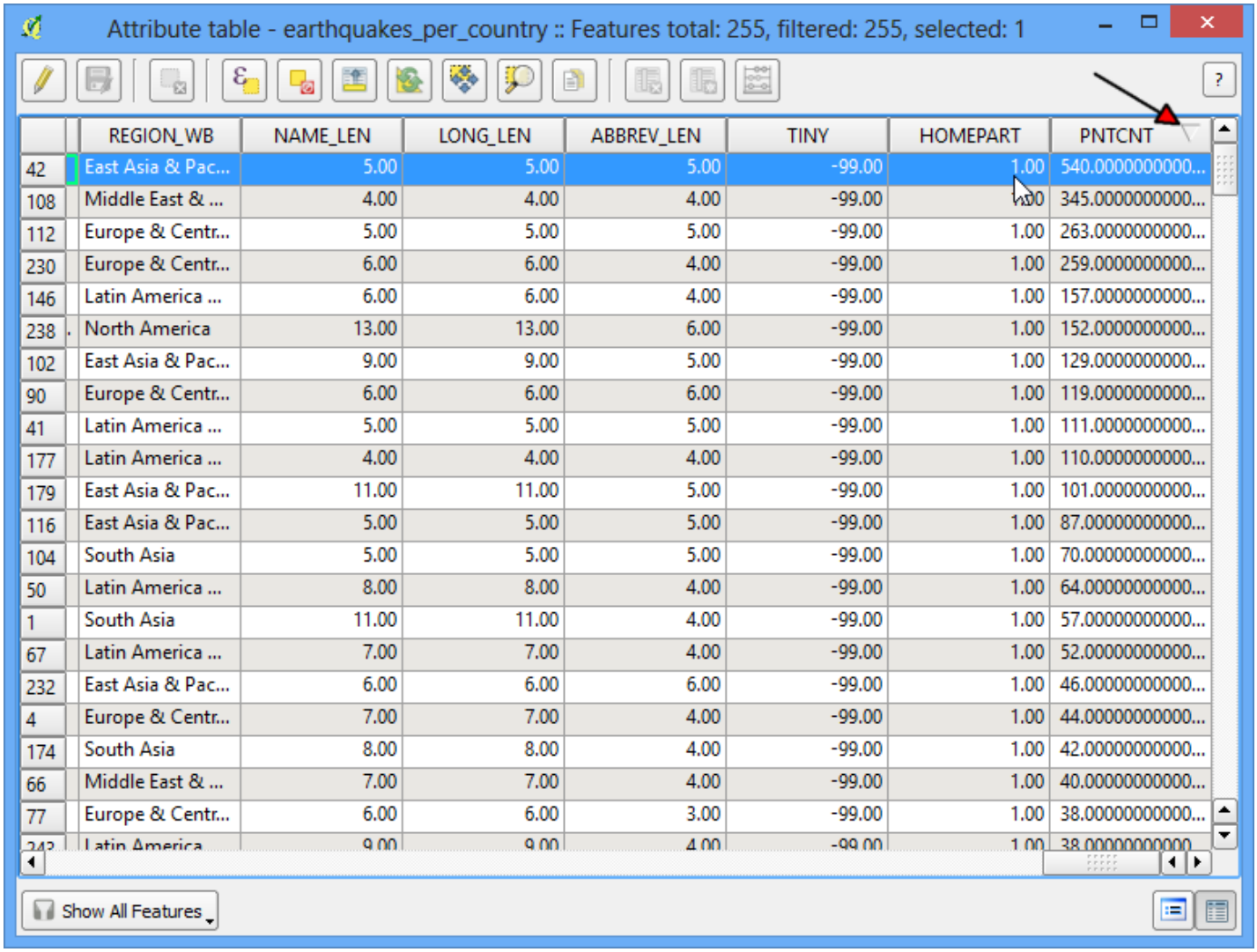


9. In the attribute table, you will notice a new field named `PNTCNT`. This is the count of number of points from the earthquakes layer that fall within each polygon.



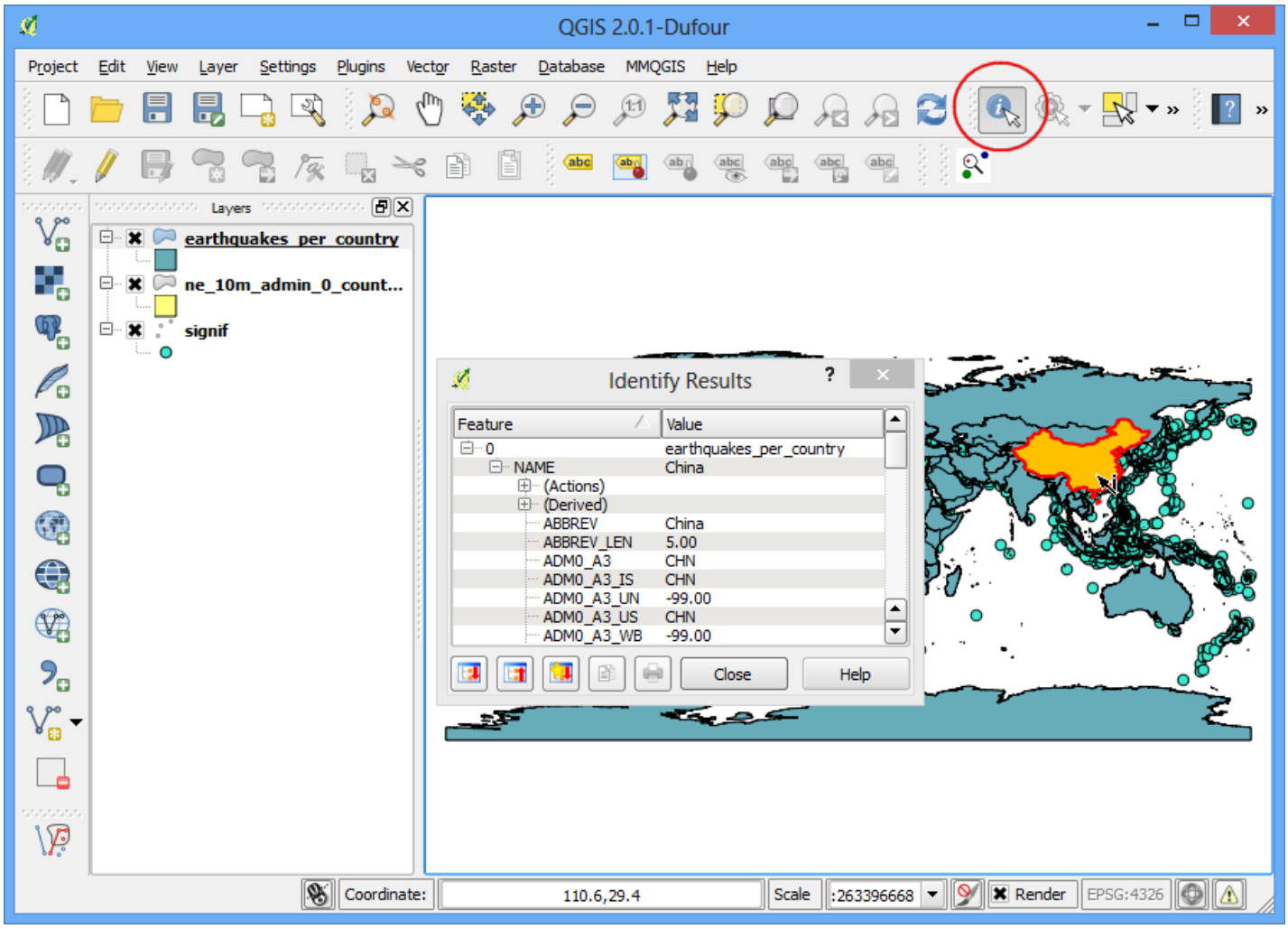
	REGION_WB	NAME_LEN	LONG_LEN	ABBREV_LEN	TINY	HOMEPART	PNTCNT
0	Latin America ...	5.00	5.00	5.00	4.00	-99.00	0.000000000000...
1	South Asia	11.00	11.00	4.00	-99.00	1.00	57.00000000000...
2	Sub-Saharan Af...	6.00	6.00	4.00	-99.00	1.00	0.000000000000...
3	Latin America ...	8.00	8.00	4.00	-99.00	-99.00	0.000000000000...
4	Europe & Centr...	7.00	7.00	4.00	-99.00	1.00	44.00000000000...
5	Europe & Centr...	5.00	13.00	5.00	5.00	-99.00	0.000000000000...
6	Europe & Centr...	7.00	7.00	4.00	5.00	1.00	0.000000000000...
7	Middle East & ...	20.00	20.00	6.00	-99.00	1.00	0.000000000000...
8	Latin America ...	9.00	9.00	4.00	-99.00	1.00	20.00000000000...
9	Europe & Centr...	7.00	7.00	4.00	-99.00	1.00	14.00000000000...
10	East Asia & Pac...	14.00	14.00	9.00	3.00	-99.00	0.000000000000...
11	Antarctica	10.00	10.00	4.00	-99.00	1.00	0.000000000000...
12	East Asia & Pac...	23.00	27.00	7.00	-99.00	-99.00	0.000000000000...
13	Sub-Saharan Af...	22.00	35.00	10.00	2.00	-99.00	0.000000000000...
14	Latin America ...	17.00	19.00	6.00	4.00	1.00	0.000000000000...
15	East Asia & Pac...	9.00	9.00	4.00	-99.00	1.00	9.000000000000...
16	Europe & Centr...	7.00	7.00	5.00	-99.00	1.00	4.000000000000...
17	Europe & Centr...	10.00	10.00	4.00	-99.00	1.00	15.00000000000...
18	Sub-Saharan Af...	7.00	7.00	4.00	-99.00	1.00	1.000000000000...
19	Europe & Centr...	7.00	7.00	5.00	-99.00	1.00	2.000000000000...
20	Sub-Saharan Af...	5.00	5.00	5.00	-99.00	1.00	1.000000000000...
21	Sub-Saharan Af...	12.00	12.00	4.00	-99.00	1.00	0.000000000000...

10. To get our answer, we can simply sort the table by `PNTCNT` field and the country with highest count will be our answer. Click 2-times on the `PNTCNT` column to get it sorted in descending order. Click on the first row to select it and close the Attribute Table.



	REGION_WB	NAME_LEN	LONG_LEN	ABBREV_LEN	TINY	HOMEPART	PNTCNT
42	East Asia & Pac...	5.00	5.00	5.00	-99.00	1.00	540.0000000000...
108	Middle East & ...	4.00	4.00	4.00	-99.00	1.00	345.0000000000...
112	Europe & Centr...	5.00	5.00	5.00	-99.00	1.00	263.0000000000...
230	Europe & Centr...	6.00	6.00	4.00	-99.00	1.00	259.0000000000...
146	Latin America ...	6.00	6.00	4.00	-99.00	1.00	157.0000000000...
238	North America	13.00	13.00	6.00	-99.00	1.00	152.0000000000...
102	East Asia & Pac...	9.00	9.00	5.00	-99.00	1.00	129.0000000000...
90	Europe & Centr...	6.00	6.00	6.00	-99.00	1.00	119.0000000000...
41	Latin America ...	5.00	5.00	5.00	-99.00	1.00	111.0000000000...
177	Latin America ...	4.00	4.00	4.00	-99.00	1.00	110.0000000000...
179	East Asia & Pac...	11.00	11.00	5.00	-99.00	1.00	101.0000000000...
116	East Asia & Pac...	5.00	5.00	5.00	-99.00	1.00	87.0000000000...
104	South Asia	5.00	5.00	5.00	-99.00	1.00	70.0000000000...
50	Latin America ...	8.00	8.00	4.00	-99.00	1.00	64.0000000000...
1	South Asia	11.00	11.00	4.00	-99.00	1.00	57.0000000000...
67	Latin America ...	7.00	7.00	4.00	-99.00	1.00	52.0000000000...
232	East Asia & Pac...	6.00	6.00	6.00	-99.00	1.00	46.0000000000...
4	Europe & Centr...	7.00	7.00	4.00	-99.00	1.00	44.0000000000...
174	South Asia	8.00	8.00	4.00	-99.00	1.00	42.0000000000...
66	Middle East & ...	7.00	7.00	4.00	-99.00	1.00	40.0000000000...
77	Europe & Centr...	6.00	6.00	3.00	-99.00	1.00	38.0000000000...
243	Latin America	9.00	9.00	4.00	-99.00	1.00	38.0000000000...

11. Back in the main QGIS window, you will see one feature highlighted in yellow. This is the feature linked to the selected row in the attribute table which had the highest number of points. Select the Identify tool and click on that polygon. You can see that the country with the highest number of Significant earthquakes is **China**.



We determined from the simple analysis of 2 datasets that China has had the highest number of major earthquakes. You may refine this analysis further by taking into consideration the population as well as the size of the country and determine which is the most adversely affected country by major earthquakes.