

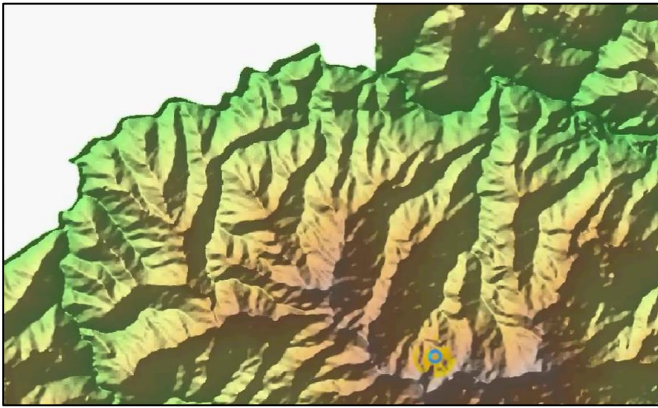
Tutorial 3: Introduction to QGIS



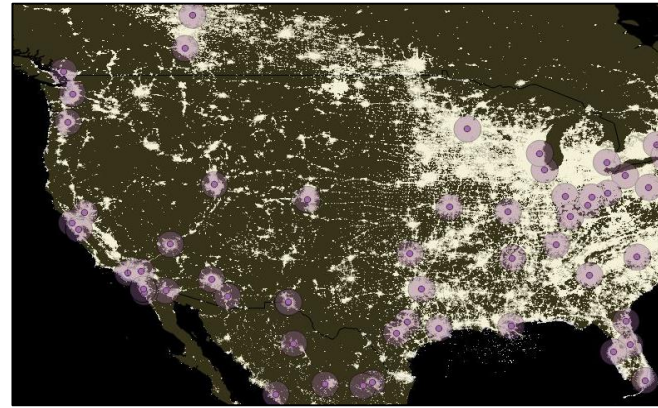
What is GIS ?

- GIS = Geographic Information System (ArcGIS, QGIS)
- Deals with spatial data, for example:

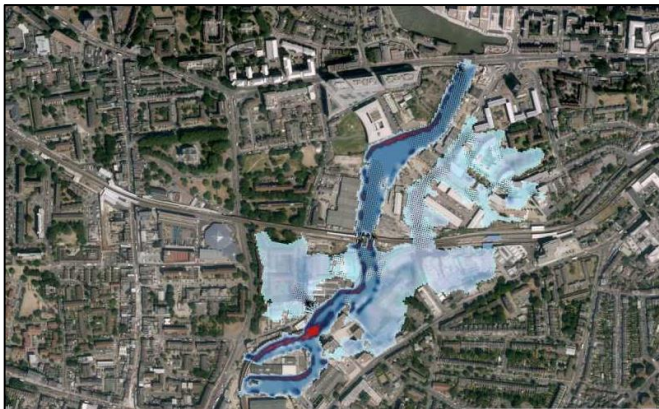
Topography



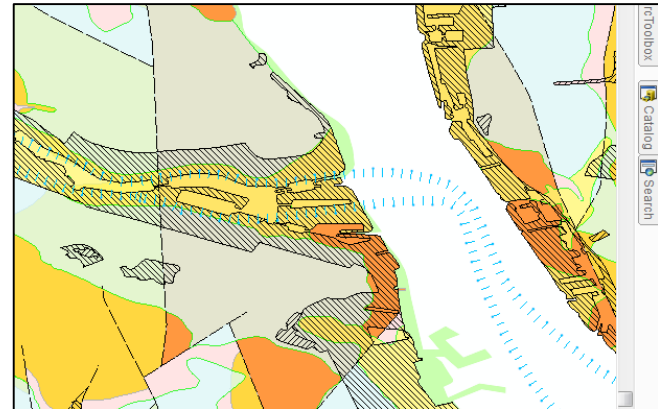
Night lights



Flood model

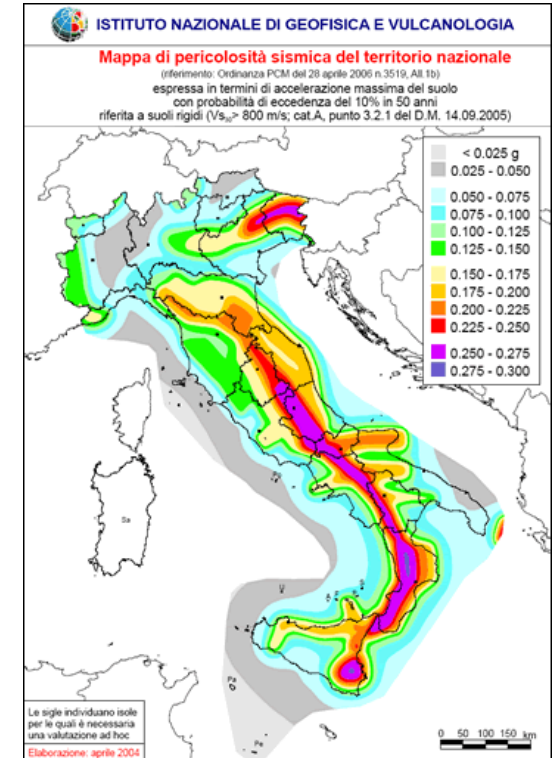
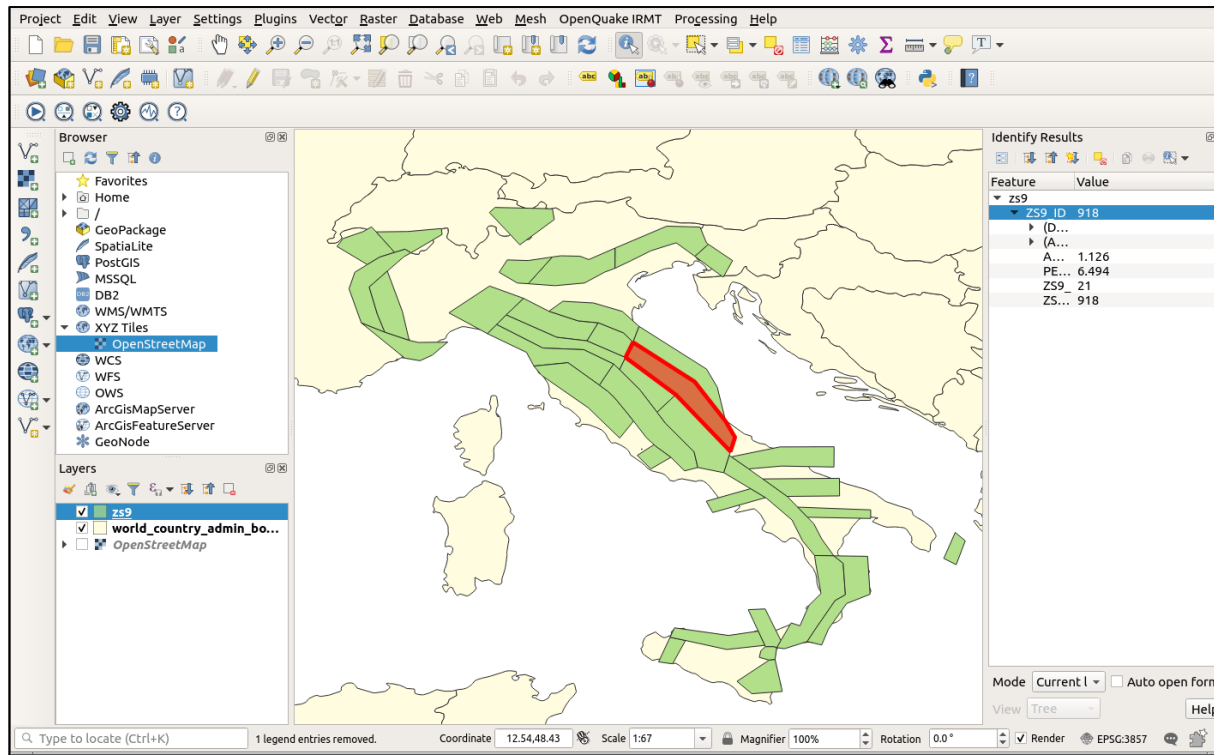


Geological map



How will we use QGIS?

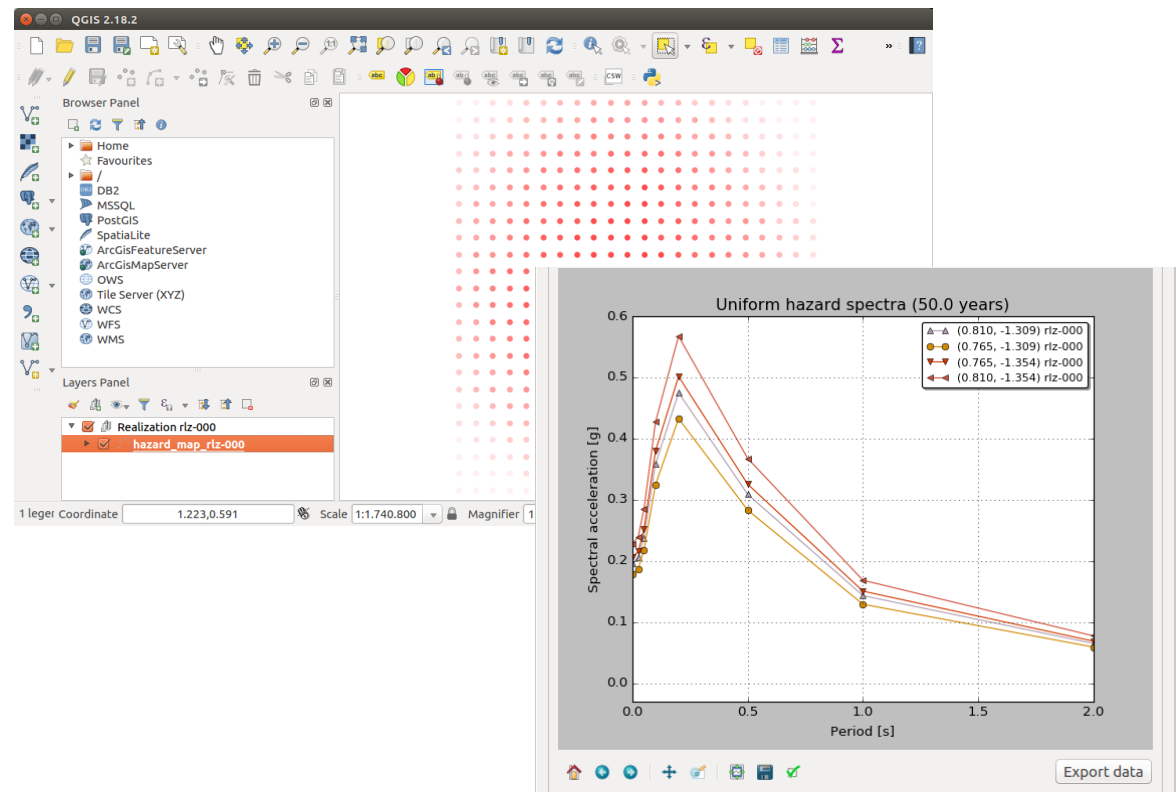
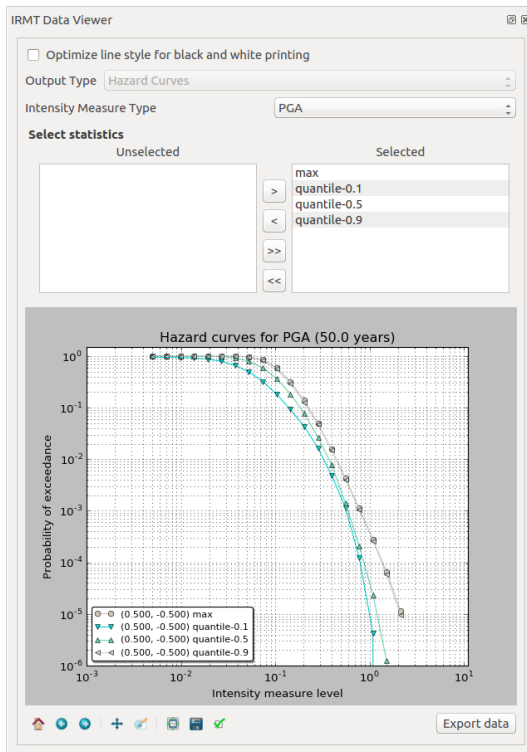
1. Characterising seismic sources for hazard model input



Seismic sources (left) used in Italian National Seismic Hazard Model

How will we use QGIS?

2. Plotting hazard output computed by OpenQuake

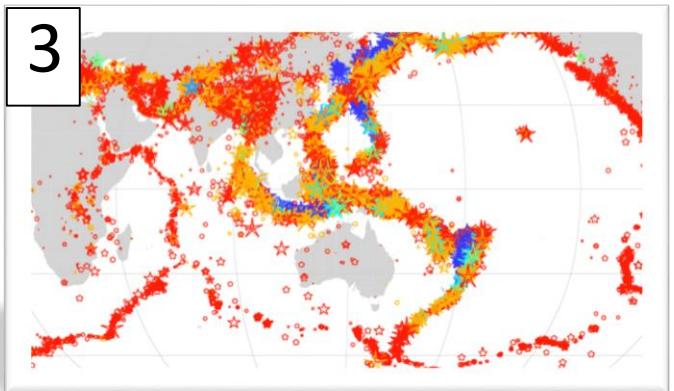


Hazard curves, maps, and uniform hazard spectra

This tutorial

We will plot together:

1. **Basemap** (underlying map)
2. **Shapefile** (country polygons)
3. **Text file** (global ISC-GEM earthquake catalogue)








Downloads

Before getting started we need to:

➤ **Download: *Practicum/DemoFiles/QGIS_layers***

Index of /Share/ES2019/Practicum

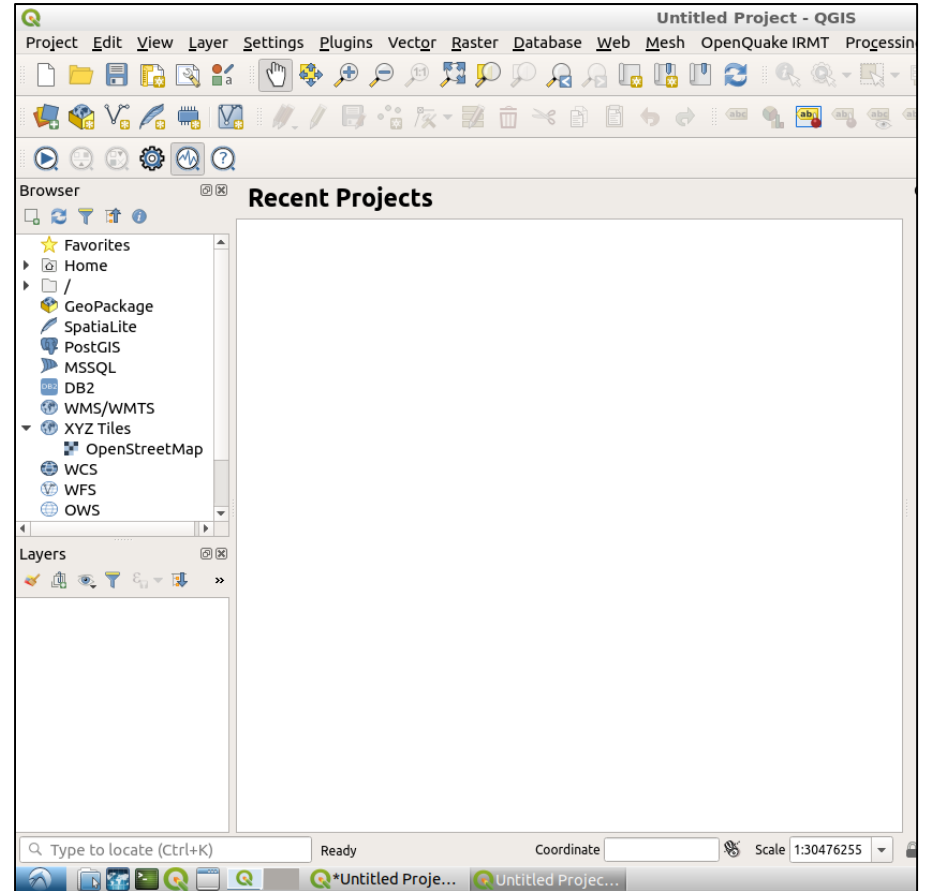
<u>Name</u>	<u>Last modified</u>	<u>Size</u>	<u>Description</u>
 Parent Directory		-	
 CheatSheets/	2019-04-07 19:56	-	
 DemoFiles/	2019-04-07 19:56	-	
 Presentations/	2019-04-07 10:55	-	
 Project/	2019-04-07 19:56	-	

Apache/2.4.7 (Ubuntu) Server at seismo.org Port 80

Either:

- Download to *your* computer and copy to the VB using the shared folder
- Download *directly* into the VB

Open QGIS





Basemap

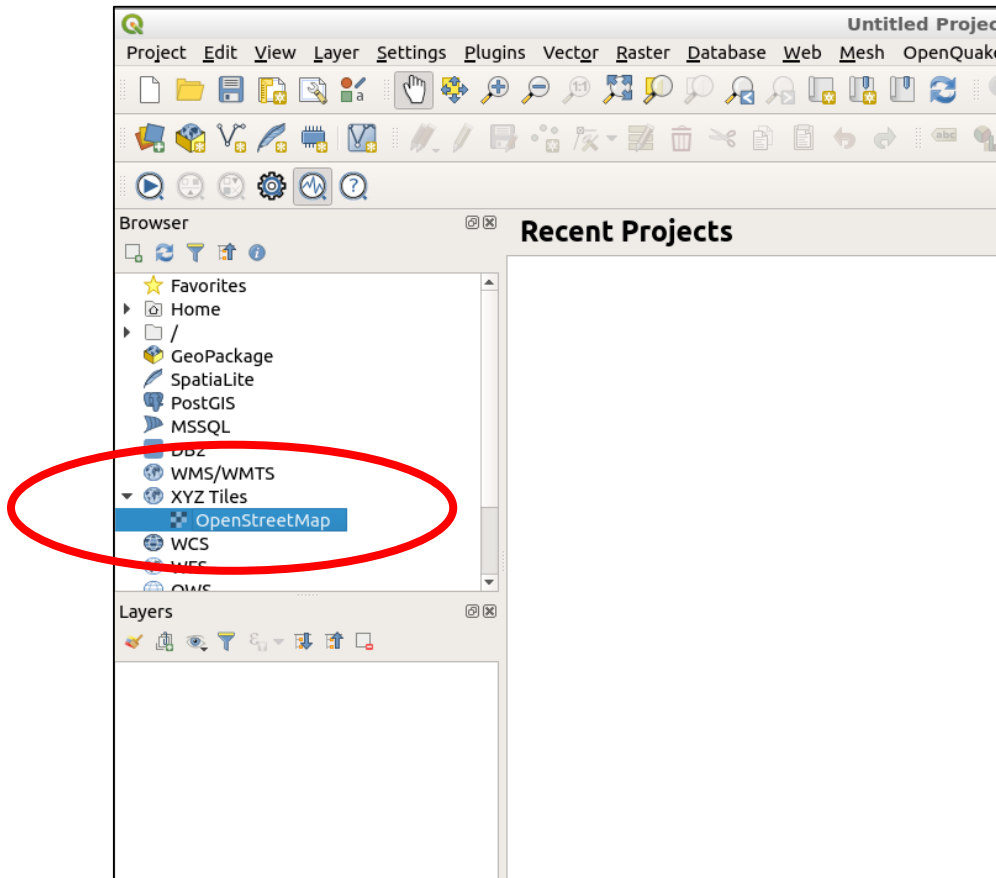


What is a Basemap?

- In simple terms, it is the background map
- Can include features such as:
 - streets, landmarks, cities, waterways, satellite imagery, areas of elevation
- Provides geographical and a visual context for data

Basemap example

Let's add the default web basemap to QGIS

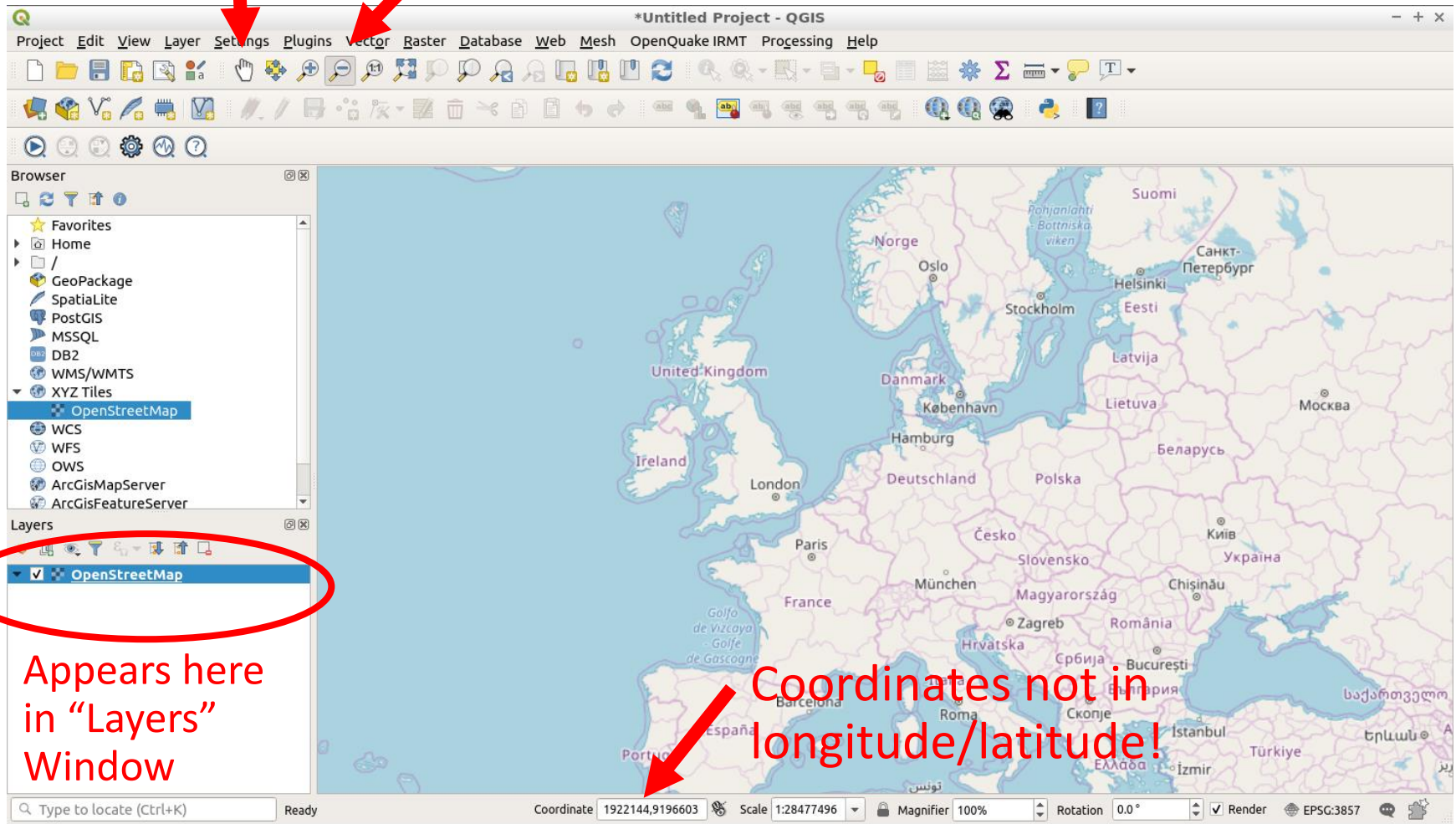


➤ Click *OpenStreetMap*

Note: web basemaps require internet during initial download, then they remain loaded in QGIS

Basemap example

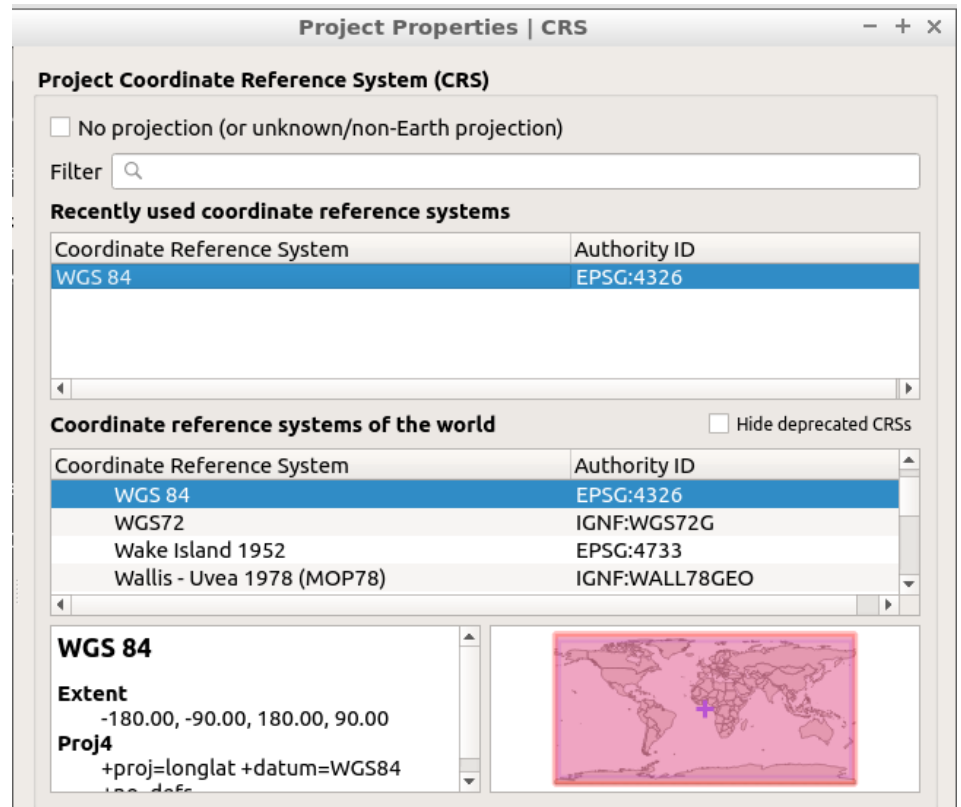
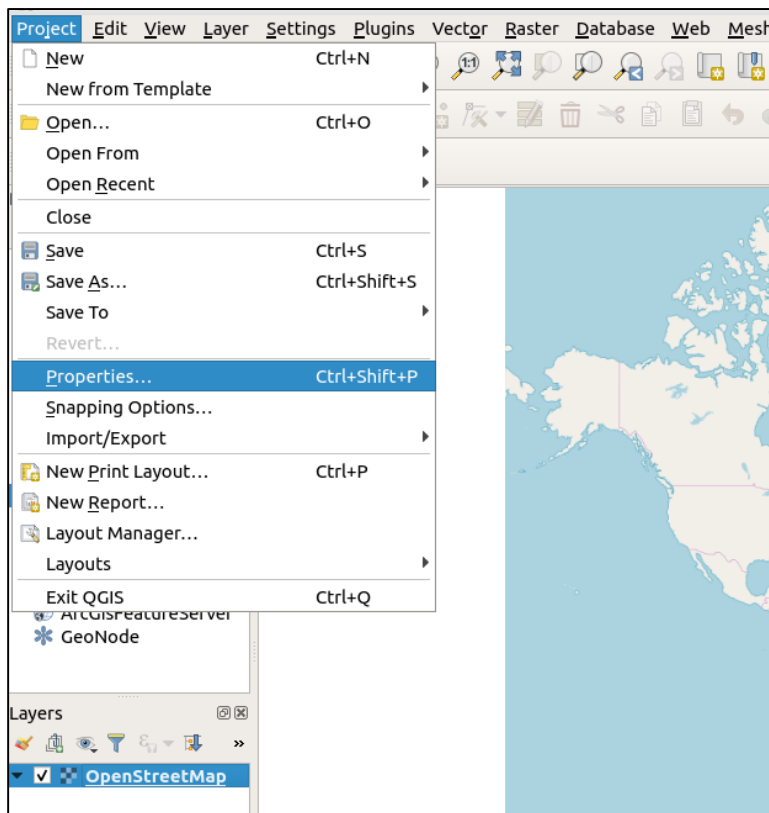
Move map Zoom in/out



Basemap example

Display basemap in terms of lon/lat (to be consistent with OpenQuake) by setting the coordinate reference system (CRS) to *WGS 84*

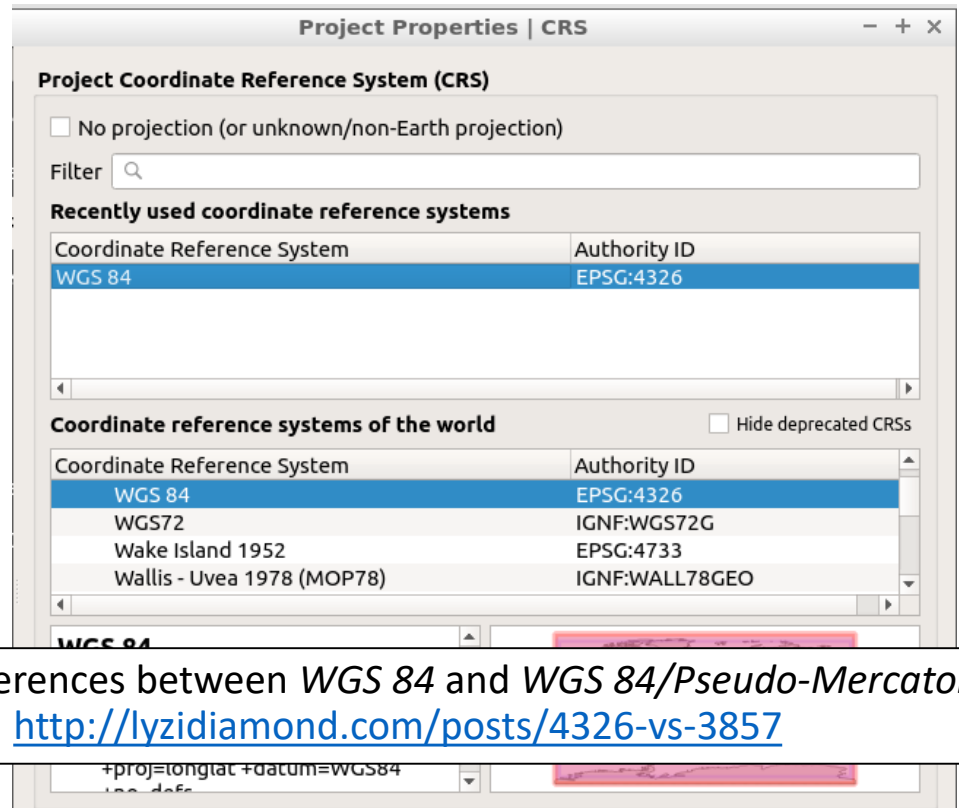
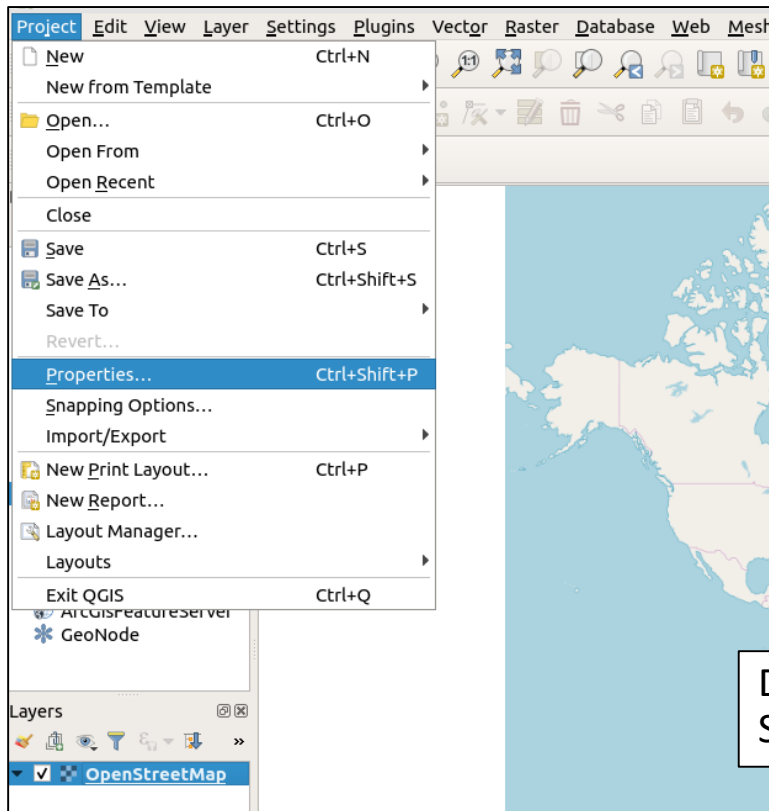
➤ *Project > Properties > select WGS 84*



Basemap example

Display basemap in terms of lon/lat (to be consistent with OpenQuake) by setting the coordinate reference system (CRS) to *WGS 84*

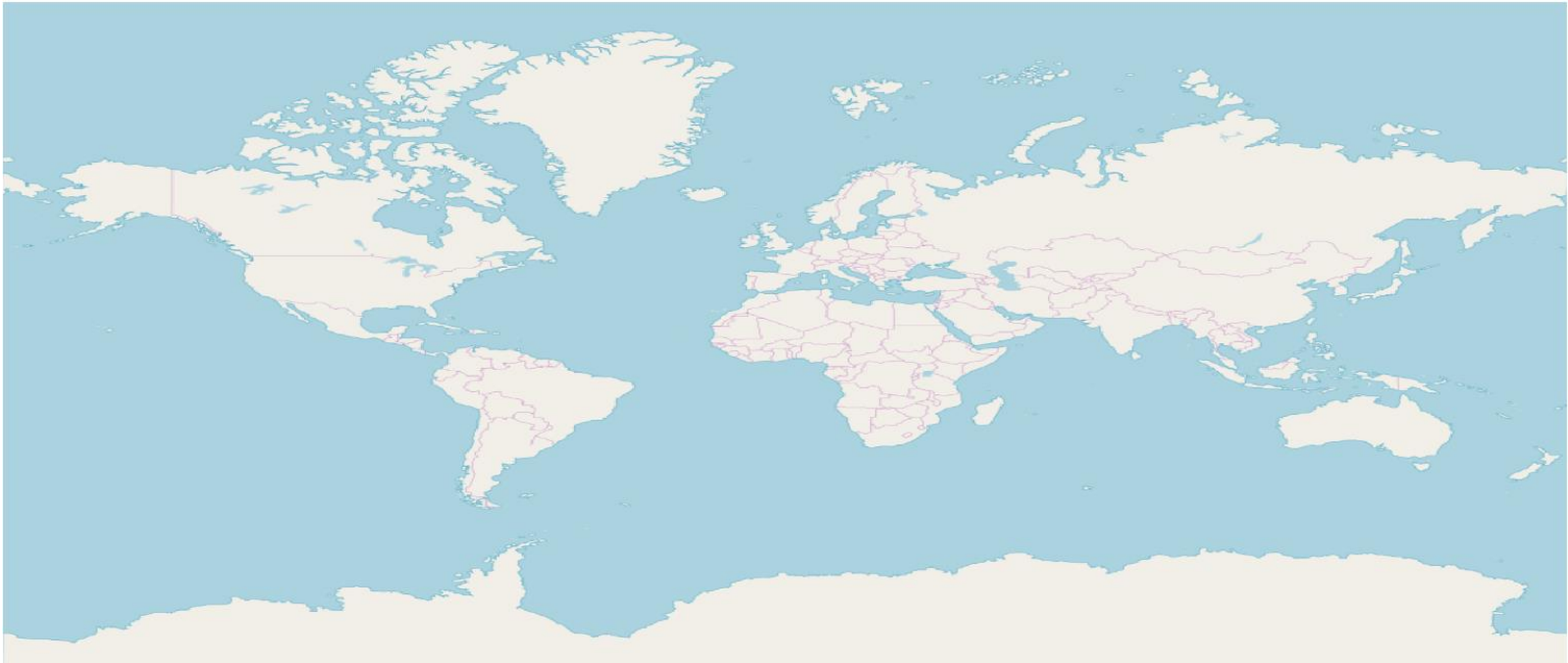
➤ *Project > Properties > select WGS 84*



Differences between *WGS 84* and *WGS 84/Pseudo-Mercator*?
See: <http://lyzidiiamond.com/posts/4326-vs-3857>

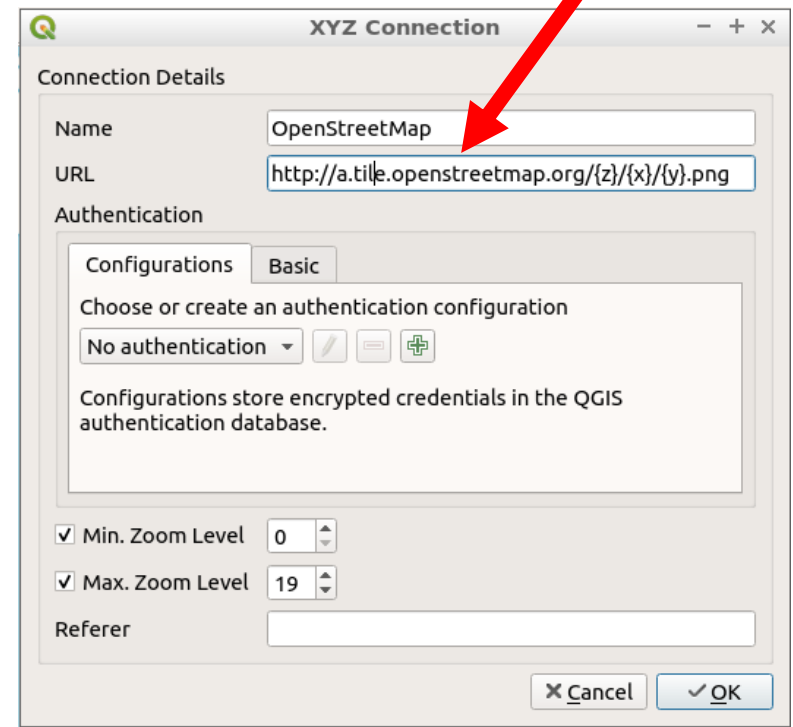
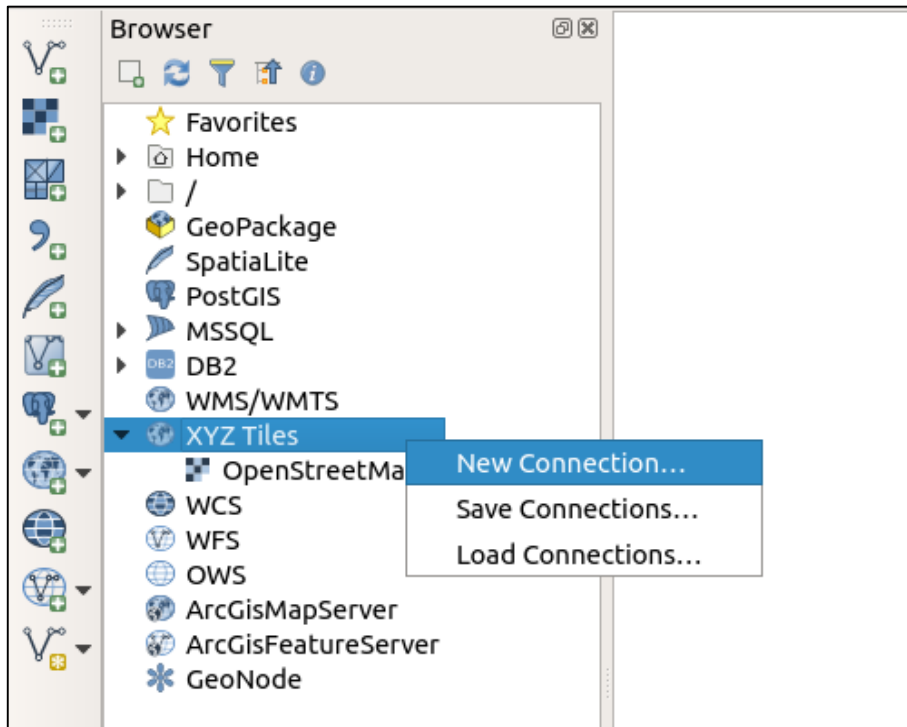
Basemap example

Note: after projecting to WGS 84 the map will look distorted when zoomed out. The distortion disappears if you zoom in



Basemap example

If interested, you can also try other web basemaps...



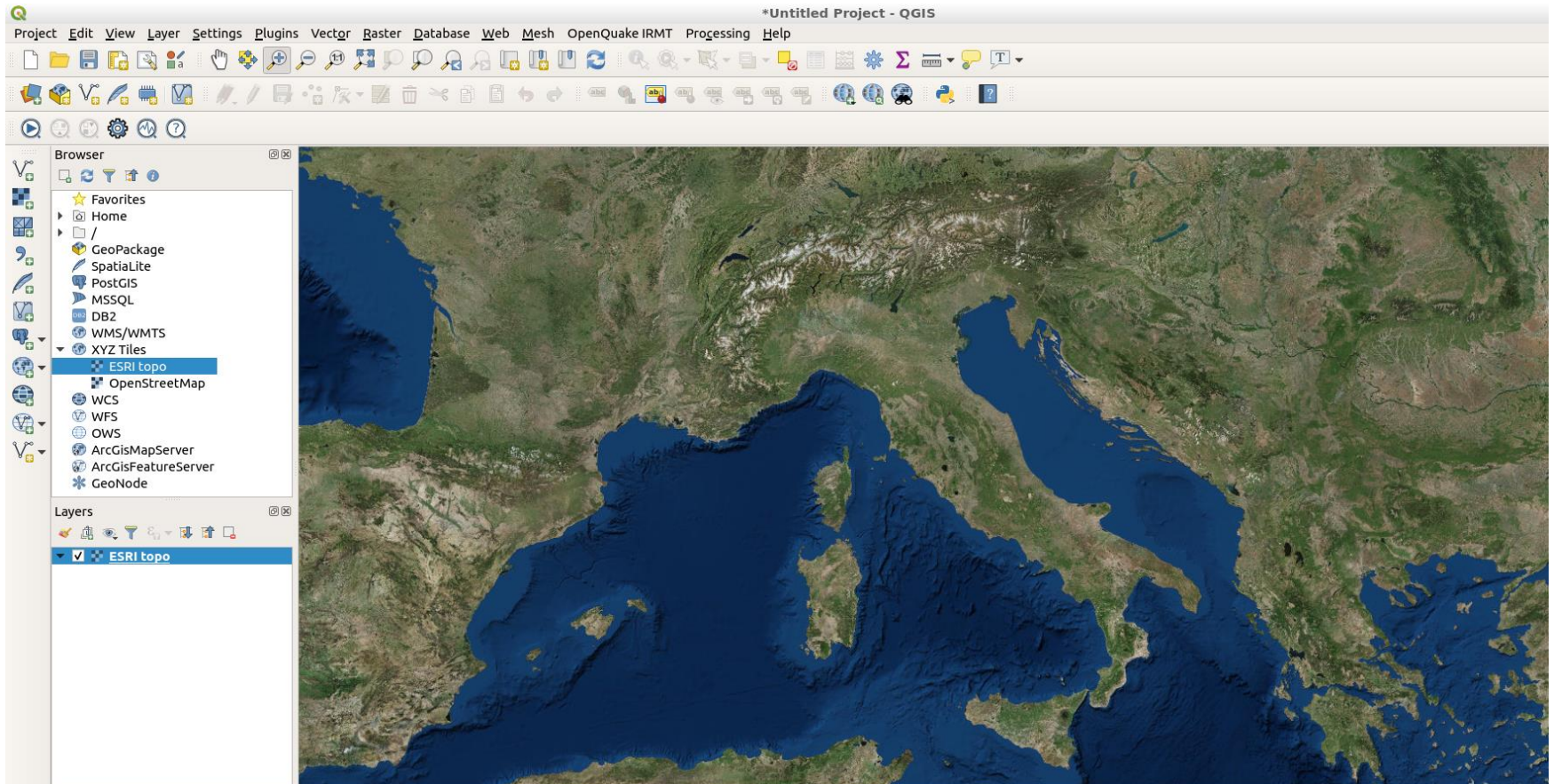
Get URLs
from:

- <https://www.spatialbias.com/2018/02/qgis-3.0-xyz-tile-layers/>
- https://wiki.openstreetmap.org/wiki/Tile_servers

Basemap example

For example, ESRI Topo

URL = https://server.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer/tile/{z}/{y}/{x}

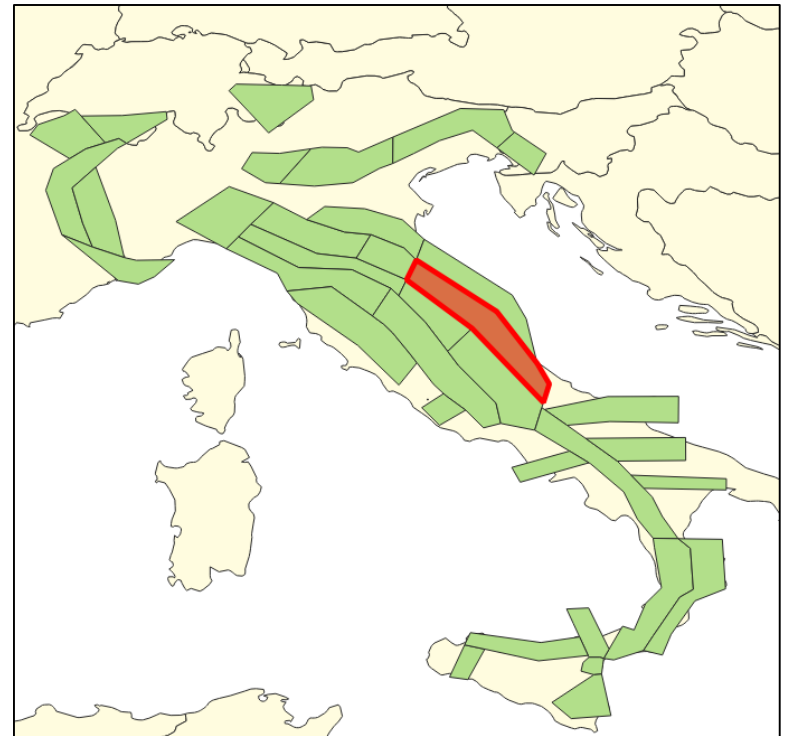


A map of Europe with a horizontal band across the center containing the text "Shapefile". The map is colored in shades of orange and tan, with a white band across the center. The word "Shapefile" is written in black text on the white band.

Shapefile

What is a Shapefile?

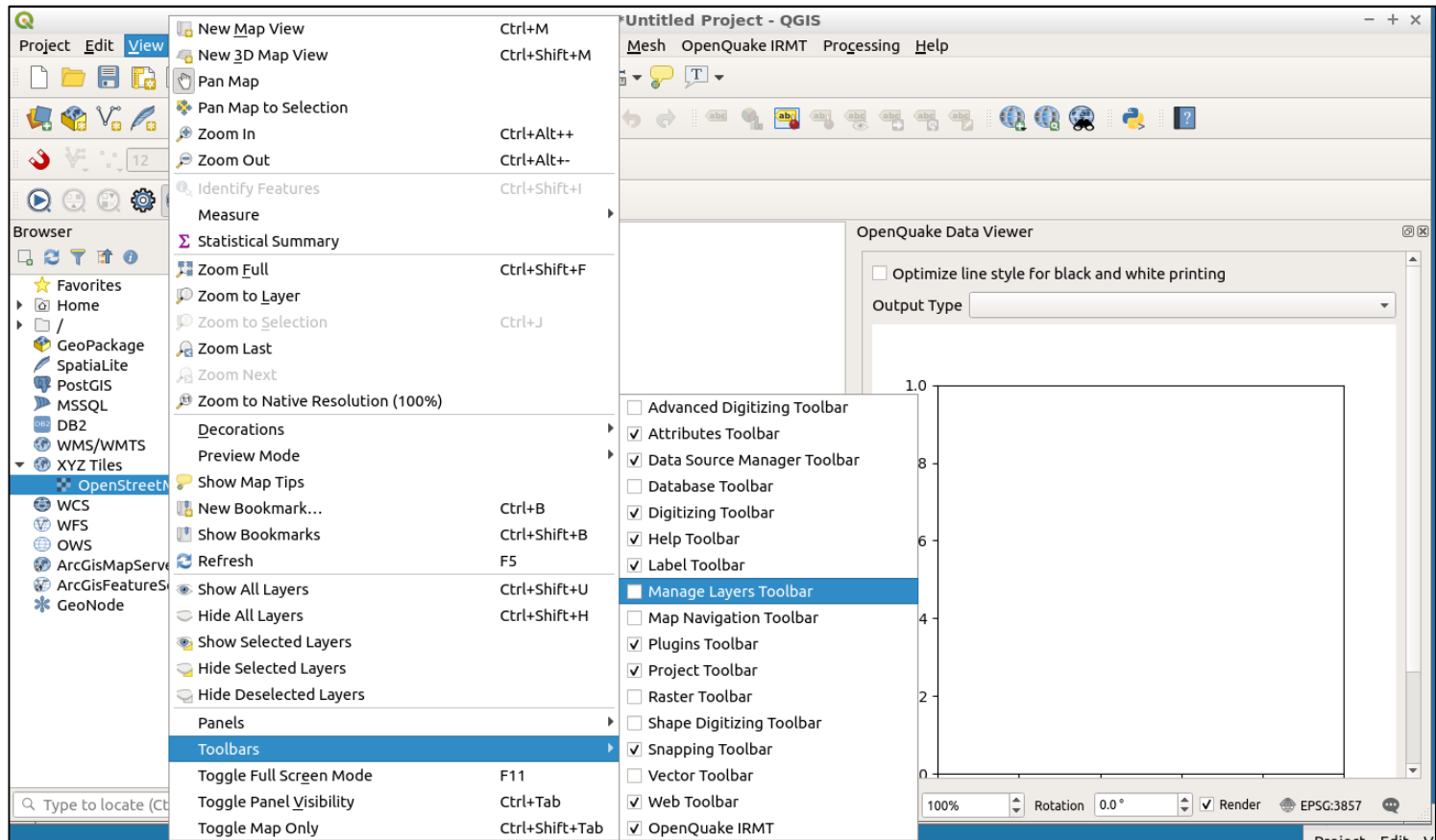
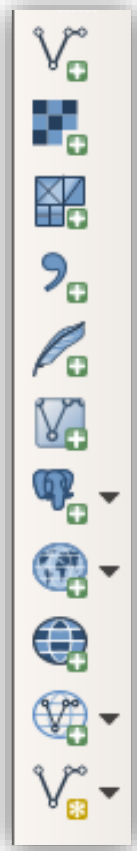
- Common geospatial **vector** data format
- Vectors = points, lines, and polygons
- Associated with a set of **attributes**, such as *name*, *magnitude*, etc



Seismic sources will be modelled in QGIS using shapefiles

Enable “Manage Layers Toolbar”

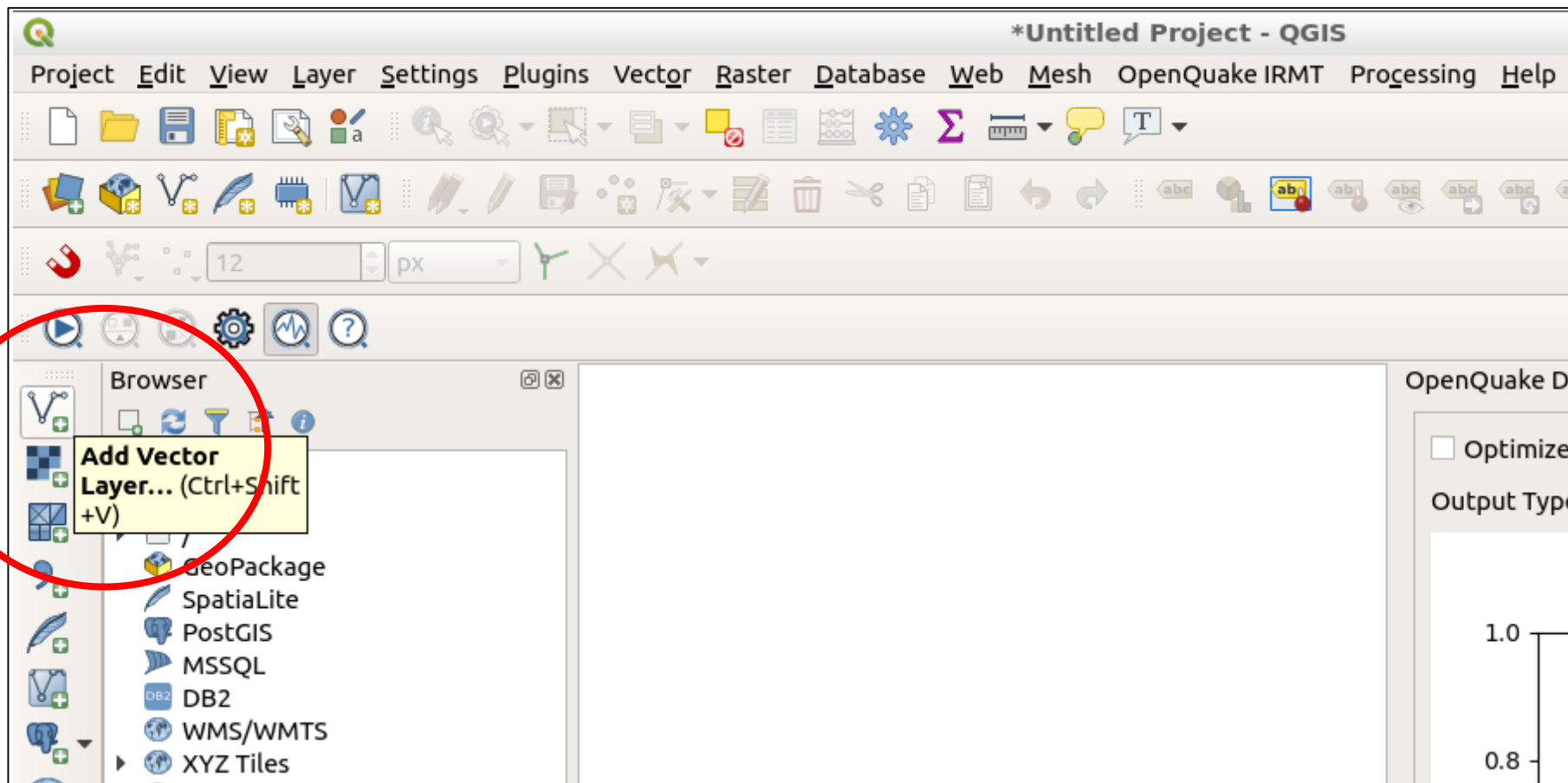
➤ *Select View > Toolbars > Manage Layers Toolbar*



Appears

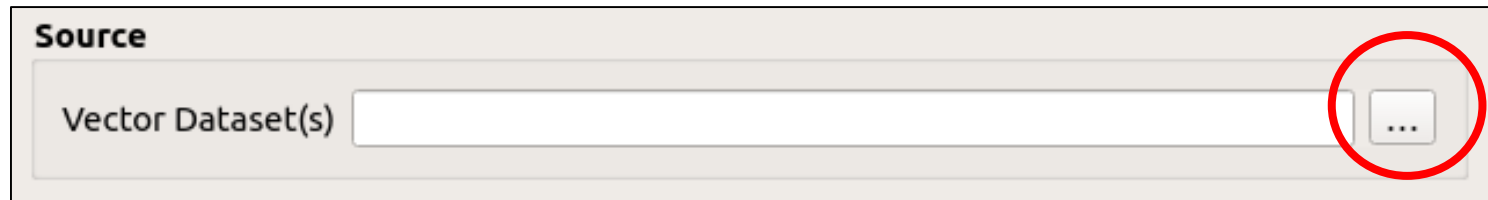
Shapefile example

➤ *Click Add Vector Layer*



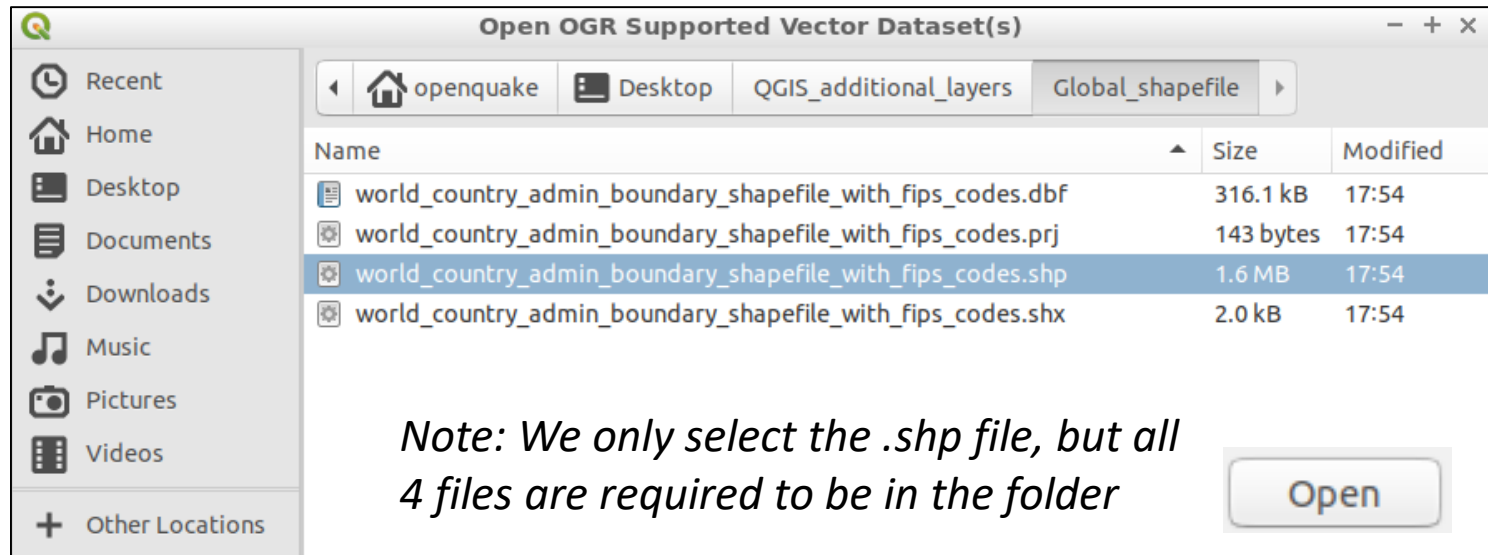
Shapefile example

➤ Add a file



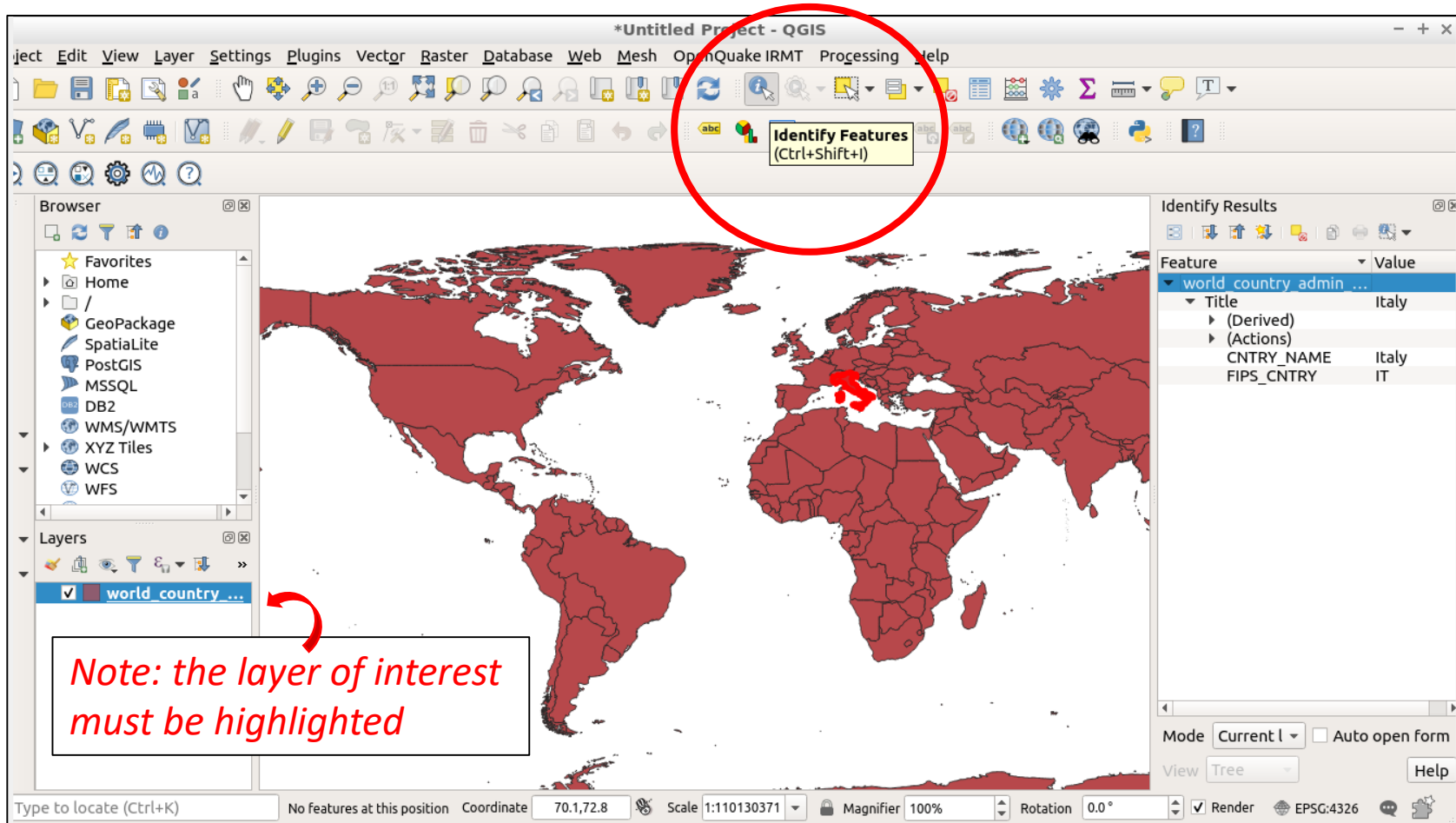
➤ Navigate to the location of the shapefile

➤ Open *world_country_admin_boundary_shapefile_with_fips_codes.shp*



Shapefile example

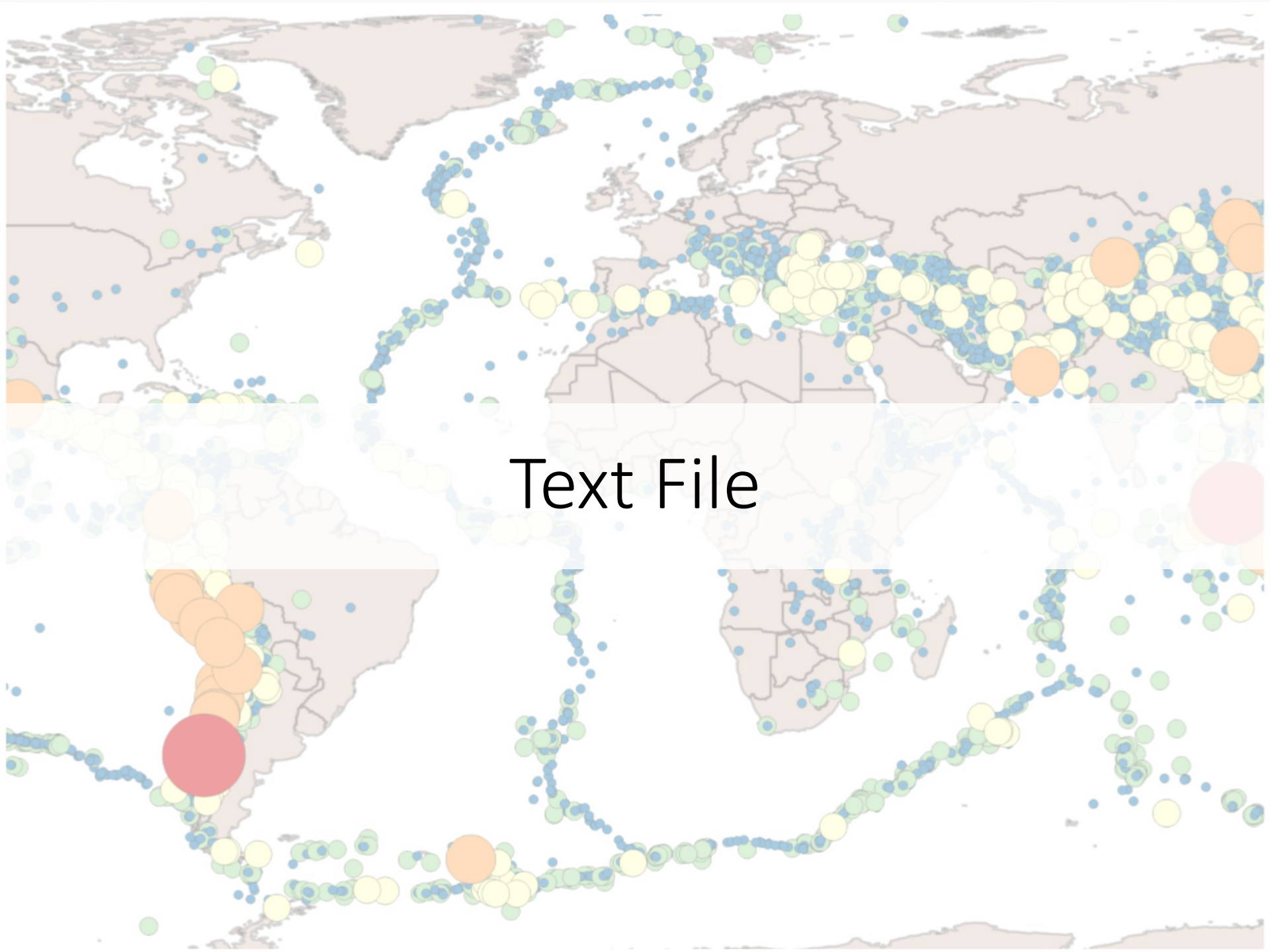
➤ Click *Identify Features*  to see shapefile attributes



The screenshot shows the QGIS interface with a world map. The 'Identify Features' tool is circled in red in the toolbar. A red arrow points to the 'world country admin ...' layer in the Layers panel. Another red arrow points to the 'Identify Features' tool. The 'Identify Results' panel on the right shows the following table:

Feature	Value
world country admin ...	
Title	Italy
(Derived)	
(Actions)	
COUNTRY_NAME	Italy
FIPS_CNTRY	IT

Note: the layer of interest must be highlighted



Text File

Text file example

- We will plot the ISC-GEM global catalogue
- ~35,000 events, 1904-2015, $5.0 < M_w < 9.6$



The screenshot shows the website for the International Seismological Centre (ISC). The header includes the ISC logo and navigation links: Home, About ISC, Staff, Contact us, Site Map. Below the header is a menu with options: About ISC, ISC Products, ISC Bulletin, ISC-GEM Catalogue, and ISC-EHB Bulletin. The main content area features a sidebar with a red header for 'ISC-GEM Catalogue' and a list of links: Introduction, People, Catalogue Overview, Download & Legal, and Update Log. The main content area is titled 'Introduction' and features a satellite image of the Earth with a yellow and green line representing the global earthquake catalog. To the right of the image is a text block describing the catalog.

ISC-GEM Catalogue

- Introduction
- People
- Catalogue Overview
- Download & Legal
- Update Log

Introduction



The **ISC-GEM Global Instrumental Earthquake Catalogue (1904-2015)** is the result of a special effort to adapt and substantially extend and improve currently existing bulletin data for large earthquakes (magnitude 5.5 and above, plus continental events down to magnitude 5.0) to serve the requirements of the specific user group who assess and model **seismic hazard and risk**.

<http://www.isc.ac.uk/iscgem/overview.php>

Text file example

- We will plot the ISC-GEM global catalogue
- ~35,000 events, 1904-2015, $5.0 < M_w < 9.6$



The screenshot shows the ISC-GEM Catalogue website. The top navigation bar includes links for 'About ISC', 'ISC Products', 'ISC Bulletin', and 'ISC-GEM Catalogue'. Below this, there are links for 'International Station Registry', 'IASPEI GT', and 'Event Bibliography'. A sidebar on the left contains a menu with 'ISC-GEM Catalogue' (highlighted in red), 'Introduction', 'People', 'Catalogue Overview', 'Download & Legal', and 'Update Log'. The main content area features an 'Introduction' section with a globe showing earthquake events as colored dots. To the right of the globe, there is text describing the catalogue's purpose: 'The ISC-GEM Catalogue is a global effort to improve earthquake catalogues (continental events down to magnitude 5.0) to serve the requirements of the specific user group who assess and model seismic hazard and risk.'

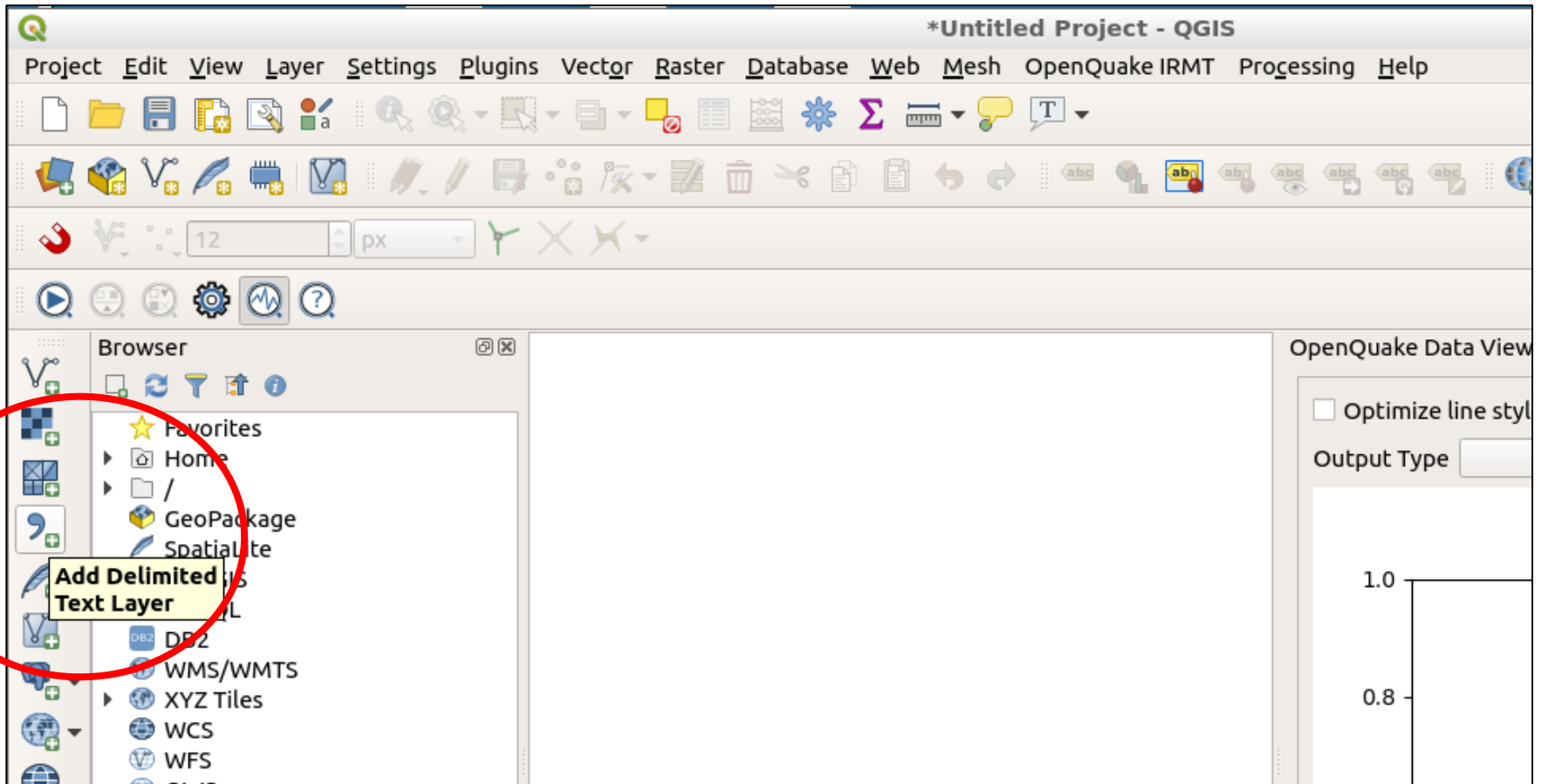
Try using the terminal to look at the catalog and count the number of earthquake events

Hint: use "more" and "wc -l"

<http://www.isc.ac.uk/iscgem/overview.php>

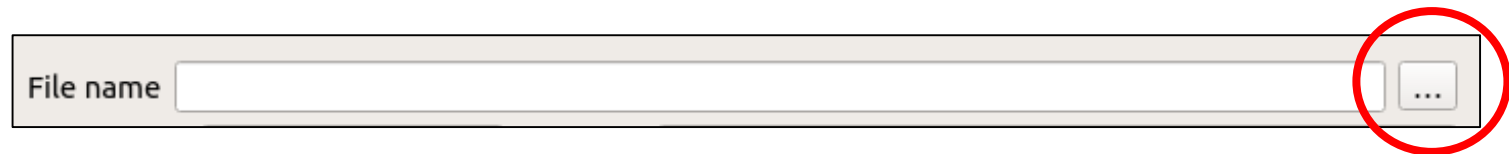
Text file example

➤ *Click Add Delimited Text Layer*

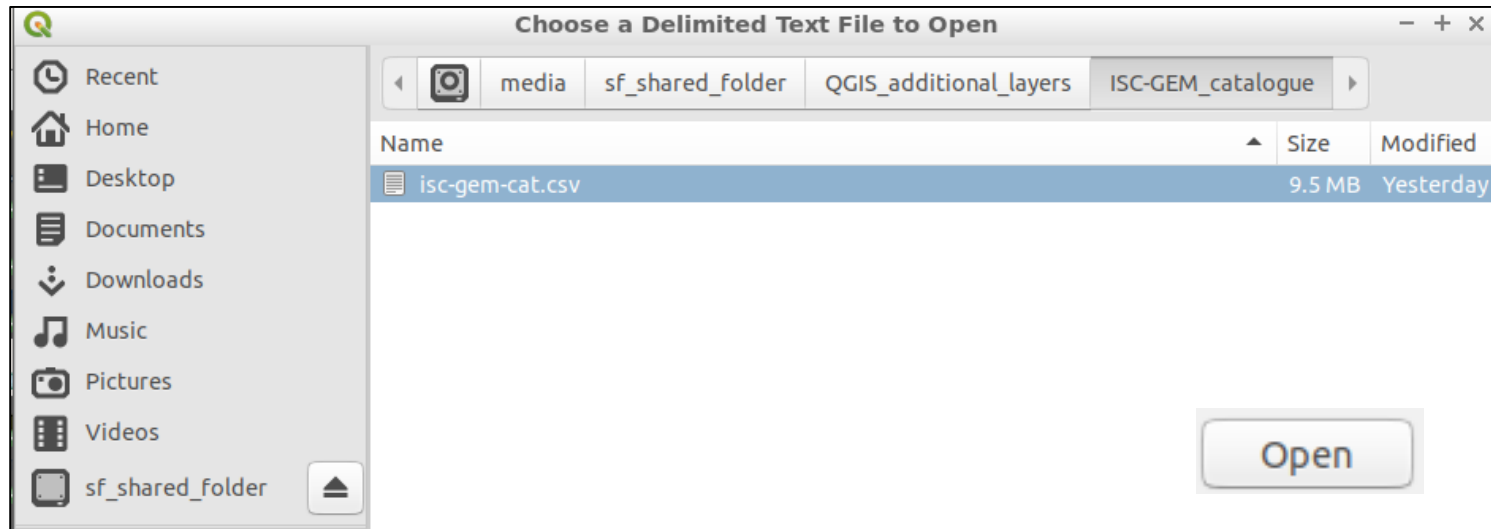


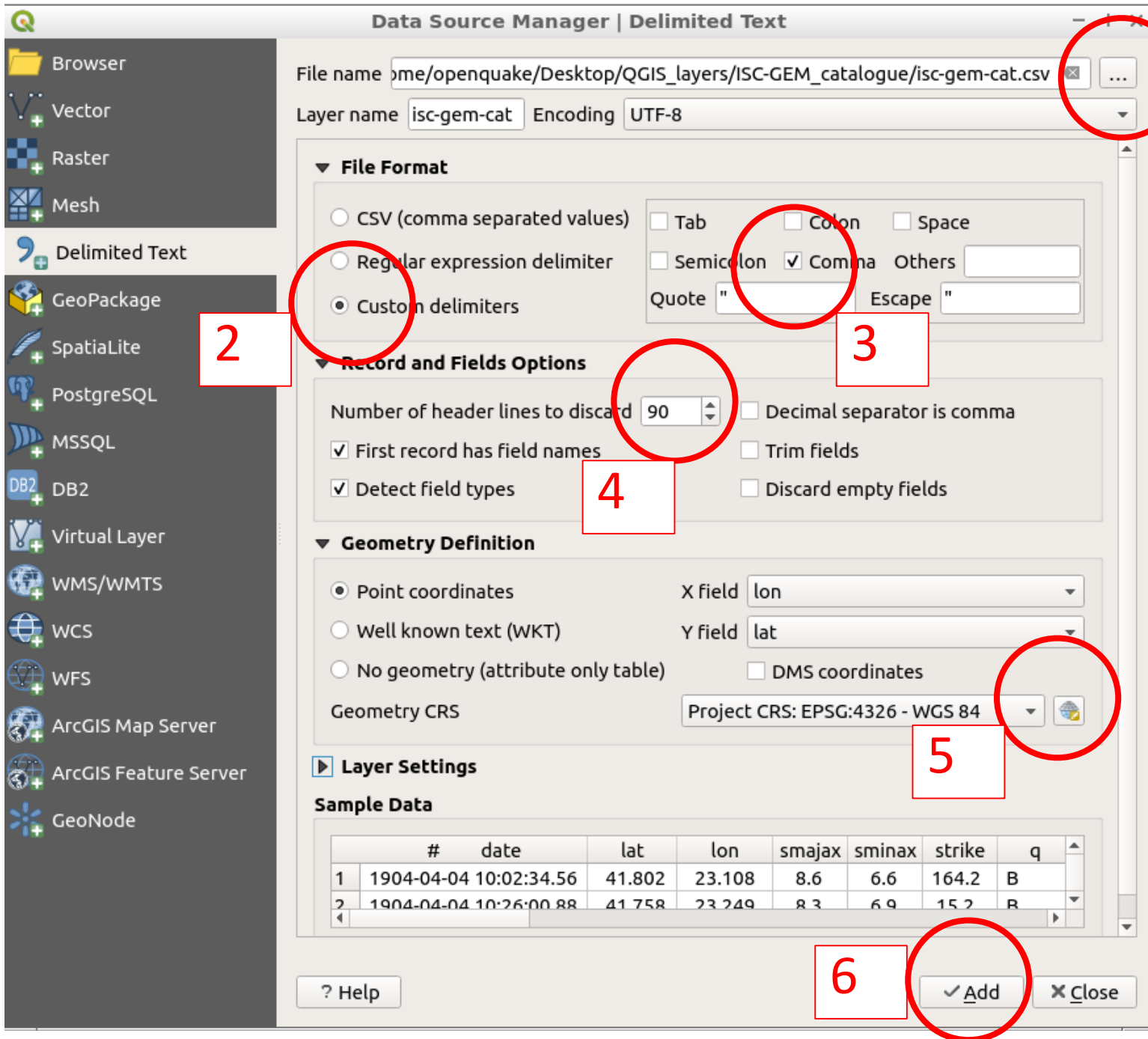
Text file example

- Add a file

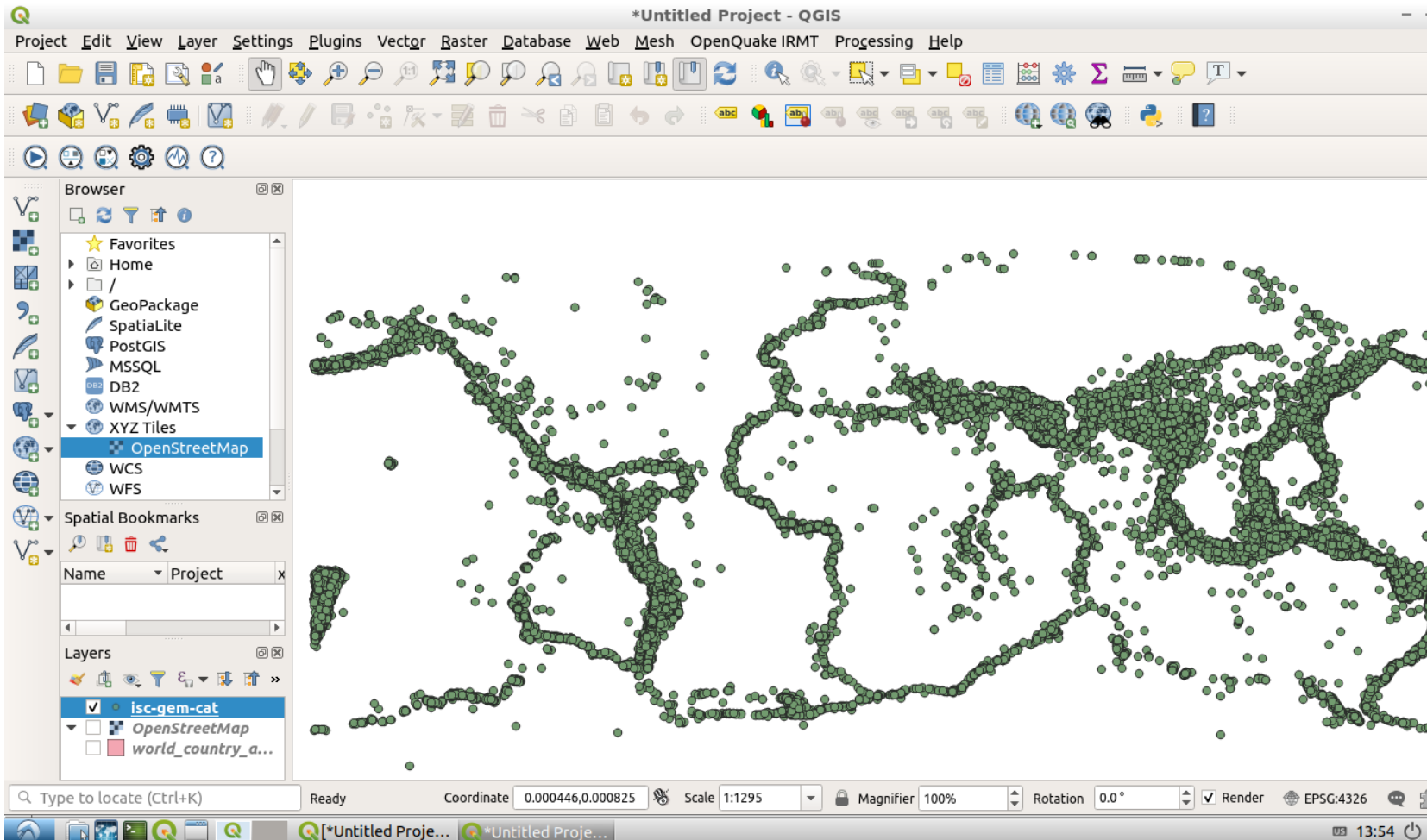


- Navigate to the location of the catalogue
- Open *isc-gem-cat.csv*



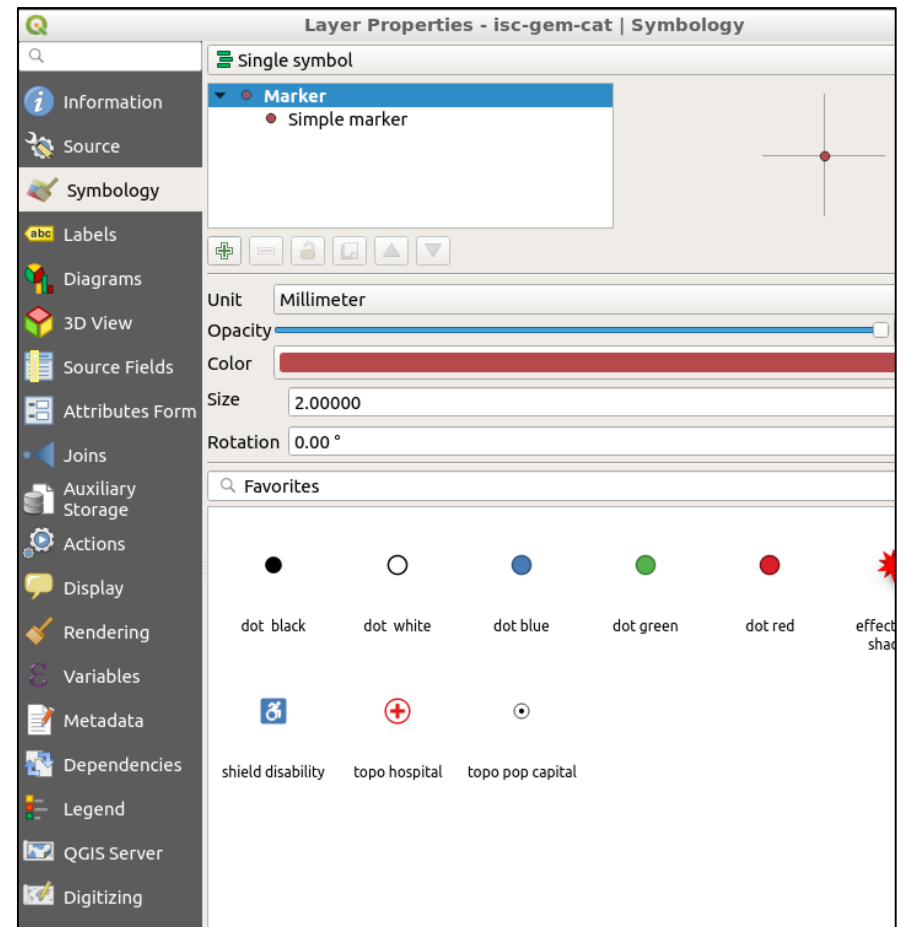
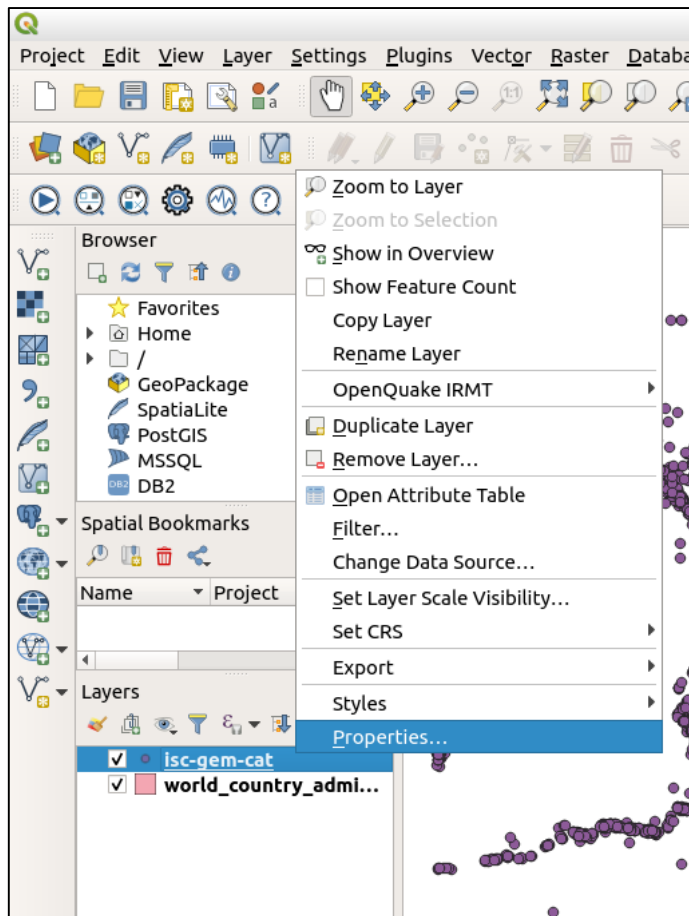


The result! But how can we distinguish the events?



Text file example

➤ Open the *Layer Properties* window



Text file example

- Select *Graduated* and play around with plot settings

Layer Properties - isc-gem-cat | Symbology

Graduated

Column: 1.2 mw

Symbol: Change...

Legend format: %1 - %2 Precision 2 Trim

Method: Color

Color ramp: [Color ramp bar]

Classes Histogram

Symbol	Values	Legend
✓ ●	4.9600 - 5.8880	4.9600 - 5.8880
✓ ●	5.8880 - 6.8160	5.8880 - 6.8160
✓ ●	6.8160 - 7.7440	6.8160 - 7.7440
✓ ●	7.7440 - 8.6720	7.7440 - 8.6720
✓ ●	8.6720 - 9.6000	8.6720 - 9.6000

Mode: Equal Interval Classes: 5

Symmetric Classification

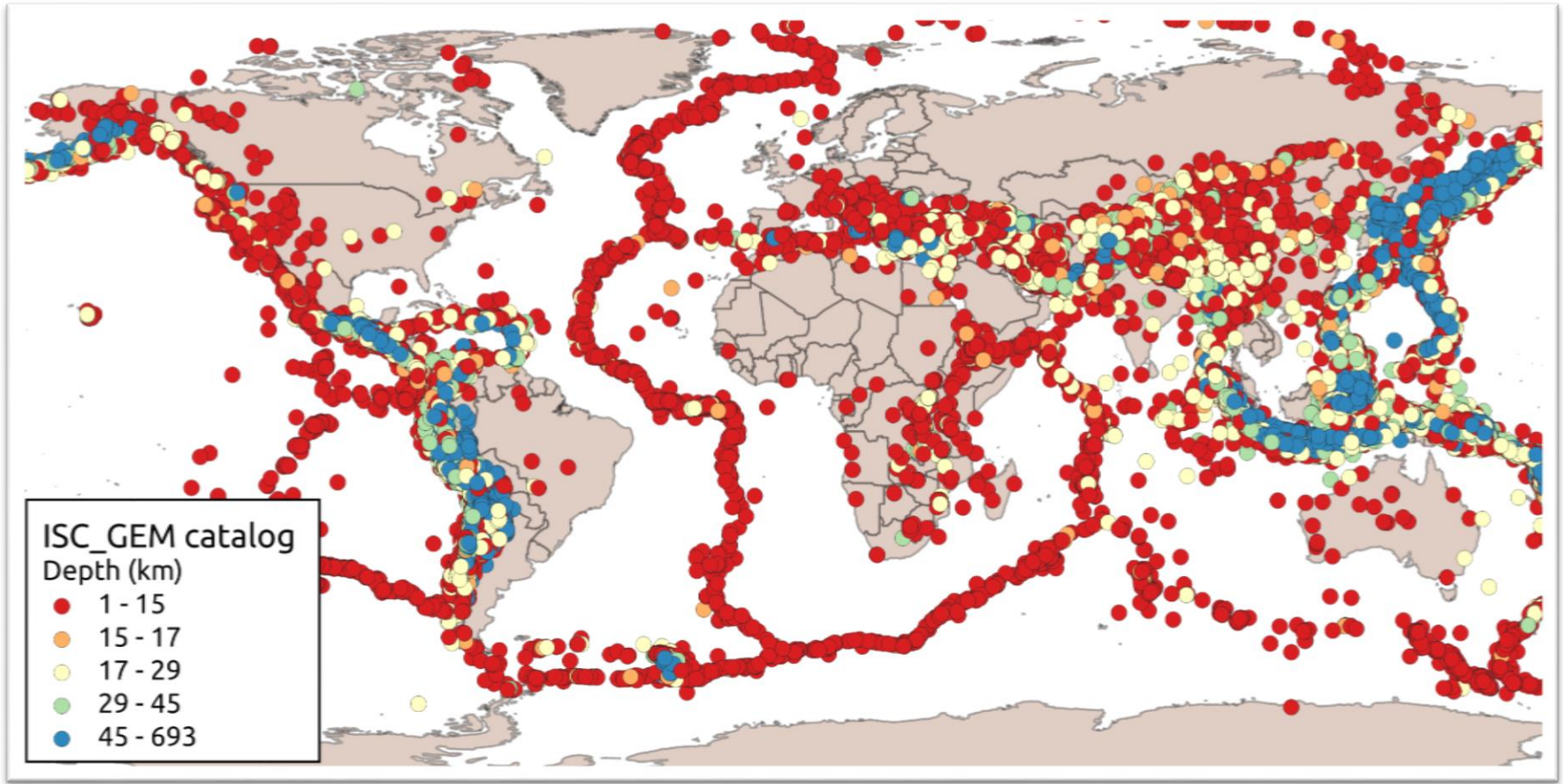
Classify [Add] [Remove] Delete All Advanced

For example:

- Plot events by magnitude
- Plot events by depth
- etc...

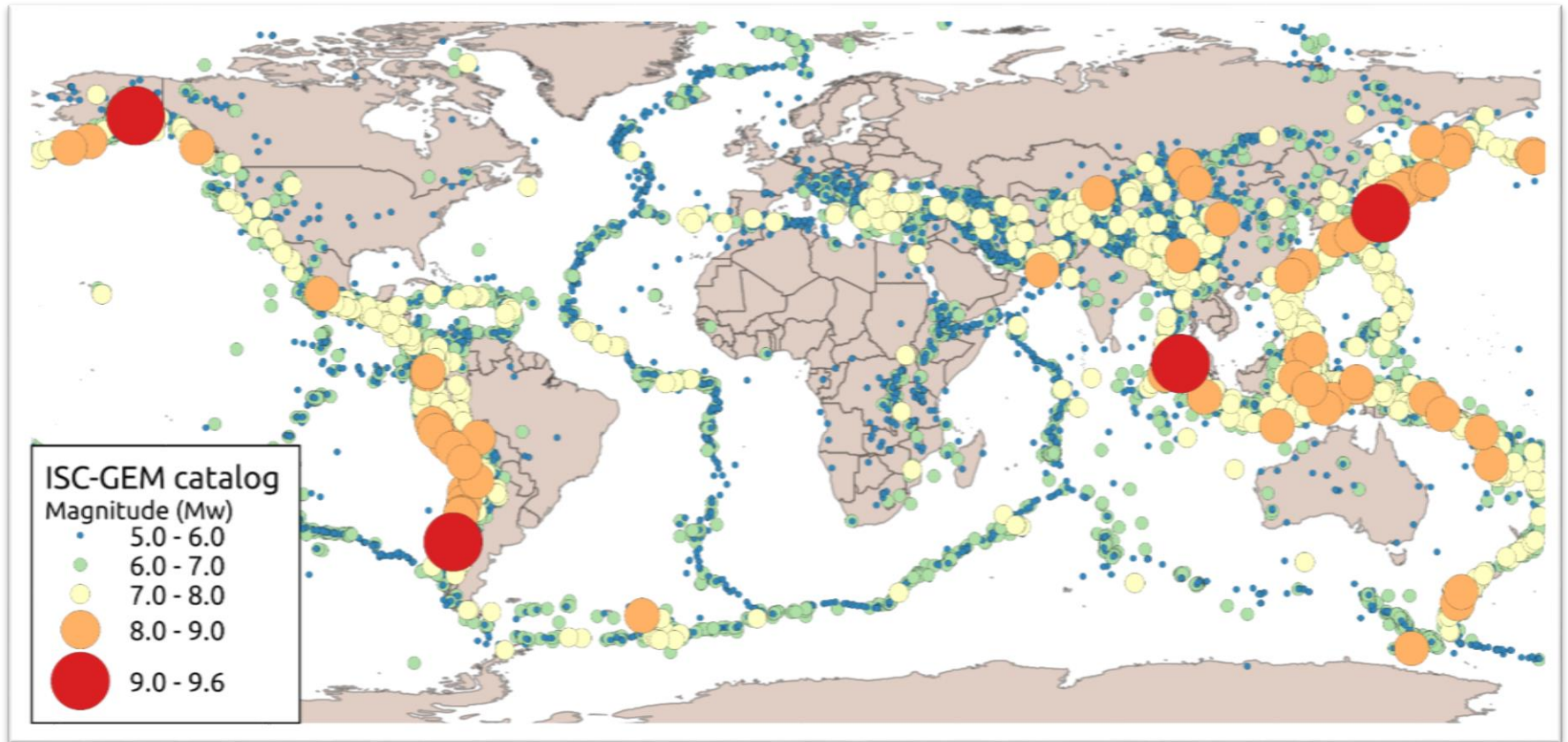
By changing the color/size of the markers

Text file example



ISC-GEM Catalogue – Events plotted by depth

Text file example



ISC-GEM Catalogue – Events plotted by magnitude

Documentation



The screenshot shows the QGIS 3.4 documentation website. The header includes the QGIS logo, the version number 3.4, the text "DOCUMENTATION QGIS 3.4", a search bar, and a language dropdown menu set to "English". The main content area is divided into two columns. The left column, titled "TABLE OF CONTENTS", lists various sections of the manual, with "User Guide/Manual" highlighted. The right column, titled "QGIS User Guide", displays a list of sections: Preamble, Foreword, Conventions (with sub-items: GUI Conventions, Text or Keyboard Conventions, Platform-specific instructions), Features (with sub-items: View data, Explore data and compose maps, Create, edit, manage and export data, Analyze data, Publish maps on the Internet, Extend QGIS functionality through plugins, Python Console, Known Issues), What's new in QGIS 3.4, and Getting Started. Navigation links "»" and "previous | next" are visible.

» previous | next

DOCUMENTATION QGIS 3.4 English ▼

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https://docs.qgis.org/3.4/en/docs/user_manual/

