

# PLATE TECTONICS DATA VIEWER

Developed by Claudia Owen and Eric Sproles

## What is a Data Viewer?

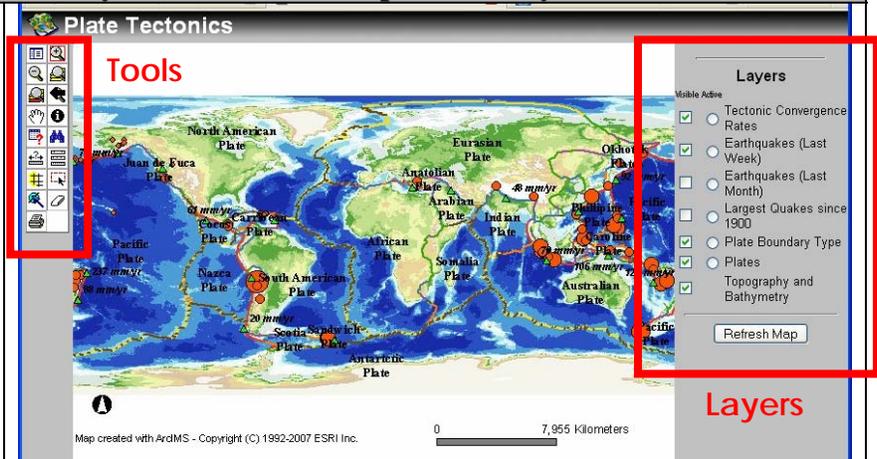
A data viewer is a program to view maps on the Internet that were generated by a Geographic Information System (GIS). Like a paper map, these maps will have varieties of information about locations or features (for example: roads, rivers, cities) as well as thematic information (like population, dominant languages, literacy rate, rainfall). However, unlike paper maps, maps in the data viewer are dynamic. You can choose which information (data layer) you wish to view. You can zoom in and out to view different scales of information. You can also select information by asking spatial questions, using logical arguments to form queries. For example: Find all the Earthquakes with a magnitude greater than 5.0. (Mag > 5.0). In this case, all Earthquakes with a magnitude greater than 5.0 will be “selected” or highlighted. (You use a query each time you use a search engine to search the internet for a website about a particular subject.)

This lesson is designed to take you through some of the features available on this GIS data viewer. Remember that learning any new tool or concept can be **frustrating** at first. You may need to repeat a step or even start over if you get off track. However, if you follow the directions as you would when trying a new recipe or replacing the water pump on your car, you get through it.

Use an internet browser and navigate to <http://arcgis.lanecc.edu/plates>. This will open up the web based map.

### A. Take a few minutes to orient yourself with the map and what you see.

On the left side you see icons of the tools you will be using, in the middle is the map, and on the right are the data layers.



### B. Look at the data layers

You should see a map of the world with different layers of information listed on the right. Some layers are checked (visible) and some are not.

Also note that each layer has an option to be the active layer. You can only have one active layer at a time. What this means is that you can ask or query this data layer questions.

The Viewer only shows the layers that are checked or visible. Turn some layers on and off.

**Every time make sure to click Refresh Map.**

### C. Look at the legend



Look on the upper left hand side of the tools for the legend icon.

This tool switched or toggled the layers on your map with the map legend. Check out how each layer is symbolized or represented.

### D. Make a layer active

Switch back to the list layers, and make the Earthquakes (Last Week) active. Click **Refresh Map**.



Click on the Identify tool . Click on one of the largest circles. **Patience is a virtue.** You have to click on the center of the dot to get the information you are looking for.

Information about that earthquake appears in a box (table) at the bottom of the map page. Look at the data table.

**Please answer all questions on the answer sheet provided. You are now at question #1.**

1. What type of information is available in this table? (Use answer sheet)

### E. Some of the tools you will use

Below are some of the tools you will use in this exercise. Spend a minute trying them out.



Full extent – This will take you back to the original screen view or extent. For this exercise, it will always return you to the world view.



Zoom to Active Layer - This is zoom to a layer with the radio button selected



Zoom in -You can click or draw a box around the area you want to examine more closely.



Zoom out -You can click or draw a box around the area you want to back out to a larger area.



Measure – A line is drawn between mouse click and the distance is shown at the top of the window. To erase the lines use the erase tool.



Legend – This switches you between legend and layers

	Pan – Push the map view around the screen
	Measure- Measures distance on the map as lines and line segments
	Erase – Clears all selections and distances measured.
	Find – Helps locate a feature in the map
	Query – Writes and asks a question of the data. We will use this more later.

**F. Use the identify tool to fill out the table (question 2) on the answer sheet.**

Make sure that the **“Largest Quakes since 1900”** is visible and active. Make sure to refresh map. Use this tool to answer question 2.

2. Fill in the table below for the 4 largest earthquakes since 1900? (Use answer sheet)

**G. Create a query to answer questions of the map and the data**

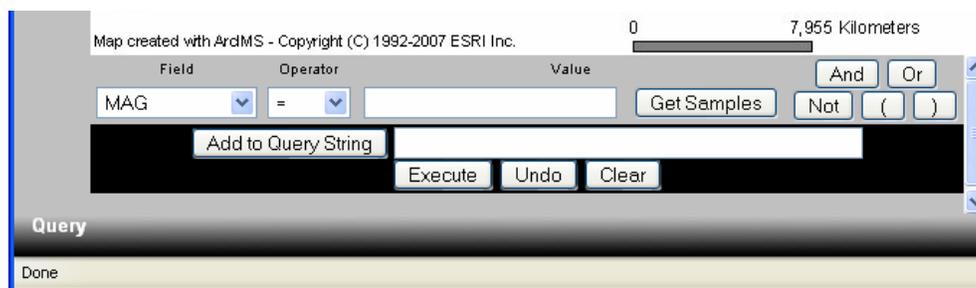
One of the most powerful aspects of using a GIS is the ability to query data. A query is a statement that asks the data a question. Queries are used to research or look deeper into the data.

While questions are easy to create conceptually, remember you are asking a database, and that databases are kind of particular. So make sure that you get the spelling and syntax correct or it will not function properly. The tutorial will walk you through the first one.

The first query is going to ask how many earthquakes over the past month have been deeper than 100km?

To do this make sure that **“Earthquakes (Last Month)”** is both active and visible, and refresh map.

- Next select the query button. You should see a dialogue open up at the bottom of the screen that looks similar to the screen below.



- First you will specify which data field to query. Under the **Field** select **“DEPTH”**.
- Now you need to provide the range of values you are looking for. Under **Operator** select **“>=”** (greater than or equal to).
- For value type in **“100”**

- Now press “**Add to Query String**”, and you should see in the box to the right “DEPTH >= 100”.  
If not edit it until you get it correct.
- Now we want to execute our query. To do so click execute, and you should see a table that lists all of the earthquakes over the past month that have been deeper than 100 km. Use this table to answer question 3.
- You may have the option to display more records (at the bottom of the table). Make sure to look at all of them.

3. How many quakes during the last month have been deeper than 100 km?  
(Use answer sheet)

#### H. Create a connected query.

You will use the same query you did last time, but add a bit more to it.

- Create the same query you just did, but **do not hit execute**.
- After you have added the query string, select “**AND**”, and you should see this added to the query string. Now create a new query that has MAG > 5 and add to the query string so the entire string should look like:  
**DEPTH >= 100 AND MAG > 5**
- Execute this query to answer question 4.

4. How many quakes during the last month have been deeper than 100 km and greater than magnitude 5? (Use answer sheet)

5. What types of plate boundaries are near the quakes from the previous question? (Use answer sheet)

6. Explain what a query is and how it works. (Use answer sheet)

Feel free to create your own queries that you might find interesting.

#### I. Create a buffer

This tool not only allows you to access database information, but also its spatial (location) information.

The goal of this part of the lab is to look for recent earthquakes near a subduction zone.

- Make “**Plate Boundary Type**” layer active.
- Create a query that has the Plate Type be (or equal) a Subduction Zone and execute that query.

We will use the buffer tool. This tool selects all features from one layer within a certain distance of another layer.

- 
- Select the buffer tool , and you will see the dialogue at the bottom change.
  - We want to highlight features from “*Earthquakes (Last Week)*” that are within a distance of 200km of the selected plate boundaries. Make sure to choose “Display Attributes”
  - You may have the option to display more records (at the bottom of the table). Make sure to look at all of them.

Use this information to answer question 7.

7. How many earthquakes have there been in the past month with the epicenter within 200km of a subduction zone fault? (Use answer sheet)

You now have a good base of how to use this GIS tool, and will use it to complete the rest of the questions on the answer sheet. Try to work through your problems, and think through what you are doing. There is a lot of information here; and now you know how to access it.