

GEOL 308 Natural Hazards

Activity 5: Earthquake Report

Learning Objectives

1. Evaluate the spatial extent of damage to a region from a large magnitude earthquake.
2. Understand how a given earthquake is an expression of the tectonics in a region.

You have been hired by a re-insurance company to evaluate the seismic hazards associated with a region. You will accomplish this with two tasks. Both tasks will use the resources found at the USGS earthquakes website <http://earthquake.usgs.gov/earthquakes/map/>.

1. Prepare an Earthquake Report for your given region. The report will include:
 - a. A description of the plate tectonics of a region.
 - b. A description of an earthquake in that region.
 - c. An interpretation about how the earthquake explains the tectonics of that region.

Use the USGS earthquake website to search for a recent earthquake in your country or region. Choose the largest earthquake that has information about it.

Read about the earthquake on the USGS web page. Try to find some additional supporting information about this earthquake using other sources (newspaper articles are OK, peer review journal articles are better). Learn about the regional tectonics that are the driving force causing the earthquake.

Write a 3-4 page report about this earthquake. Discuss the tectonic setting. Discuss how the earthquake is related to the tectonic setting. Include 2 figures: (1) showing the regional plate tectonics and (2) showing the earthquake location. Place these figures into your report. Write a figure caption for each figure.

Email the report to the instructor prior to the beginning of class on Thursday 3/9, the class following the mid-term.

Part I. Earthquake Report.

You will prepare an earthquake report that shows the intensity from one of the largest earthquakes in your region for the past century. The type of data that you will need to use is only available for more recent earthquakes, so it is possible that you can only use earthquakes from the past 50 years or less.

Your report will include a map that shows the location of the earthquake. Ideally, one would include some information about the magnitude or intensity of the earthquake as well.

Step 1. Search for your earthquake

Visit the USGS website listed above. Note the options in the upper right corner. Each option provides a different way to view data in this web interface. From left to right are:



- a. List – this displays or hides the list of earthquakes displayed on the map. The list shows up to the left of the map.
- b. Map – this displays or hides the map display.
- c. Settings – this changes various display settings (e.g. the temporal length and magnitude range of earthquakes, basemap, and other features).
- d. About – this allows one to learn new things about this interface.

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Click on “settings” and then click on “Search Earthquake Catalog.” A display of “Basic Options” is shown. One may select a magnitude range (Minimum and/or Maximum), a date range, and a geographic region.

Choose a date range of 1917-2017. Choose a large magnitude for the minimum and do not enter a maximum (e.g. 7.0 or 6.0). Start with M 7.0, but if there are no earthquakes as a result of your query, decrease the magnitude in steps of 0.5 until there are some earthquakes.

Click on the button “Draw Rectangle on Map” and a map interface opens up. Zoom and pan until your region is in the window. Single left click in one corner and release, then drag a rectangle, then single left click the corner opposite the first corner, forming a rectangle surrounding the region you are interested in querying. One may resize the rectangle by sliding the sides of the rectangle marked by white dots. Once you are satisfied with the region, click the “Use this Region” button.

Scroll down and click the “Search” button.

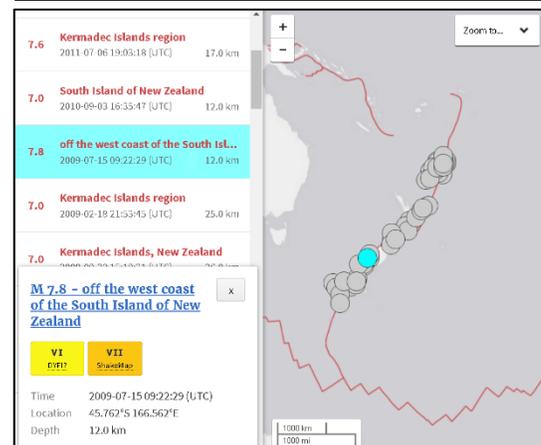
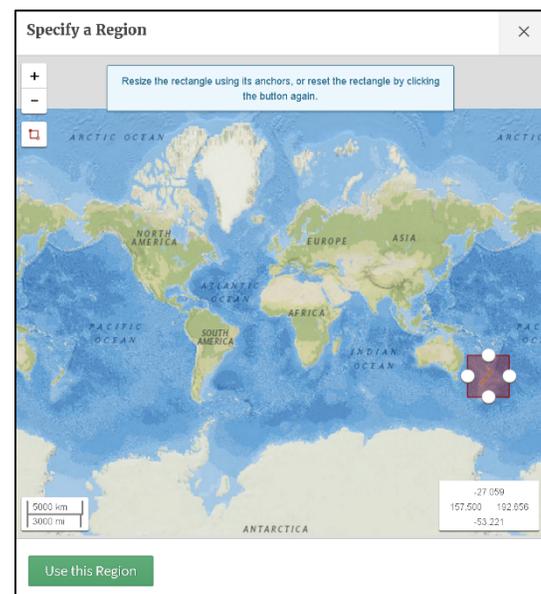
The map interface opens with earthquakes plotted as circles and a list of the earthquakes on the left. Scroll to find the largest earthquake with a dataset that will work for Part I. For example, click on a large magnitude earthquake. The earthquake list turns cyan, the epicentral dot turns cyan, and an html link displays in the lower left corner. Right click on the hyperlink and open this earthquake in a new tab. Navigate to that tab and inspect the data to see if the data type we need is available. If not, scroll up in time and choose the next largest earthquake.

There are several ways to obtain a map for your earthquake. I show an example for the M 7.8 earthquake highlighted in the map on the right.

1. Interactive Map

Click on this map and a map window opens. For most modern earthquakes, the MMI contours are plotted on this map. One may change display options (e.g. topo map or satellite imagery as a basemap, etc.) by using the layers button in the upper right corner. One will need to use a way to capture the screen with screen capture software. MS Windows includes an app called “Snipping Tool.” One could also use the “PrtScrn” button to capture the map into the computer buffer. One would need to paste this into photo editing software to crop the image to just the map.

Magnitude	Date & Time	Geographic Region
<input checked="" type="radio"/> 2.5+	<input checked="" type="radio"/> Past 7 Days	<input checked="" type="radio"/> World
<input type="radio"/> 4.5+	<input type="radio"/> Past 30 Days	<input type="radio"/> Conterminous U.S. ¹
<input type="radio"/> Custom	<input type="radio"/> Custom	<input type="radio"/> Custom
Minimum: 2.5	Start (UTC): 2017-02-22 00:00:00	Worldwide
Maximum:	End (UTC): 2017-03-01 23:59:59	<input type="button" value="Draw Rectangle on Map"/>



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2. Regional Information

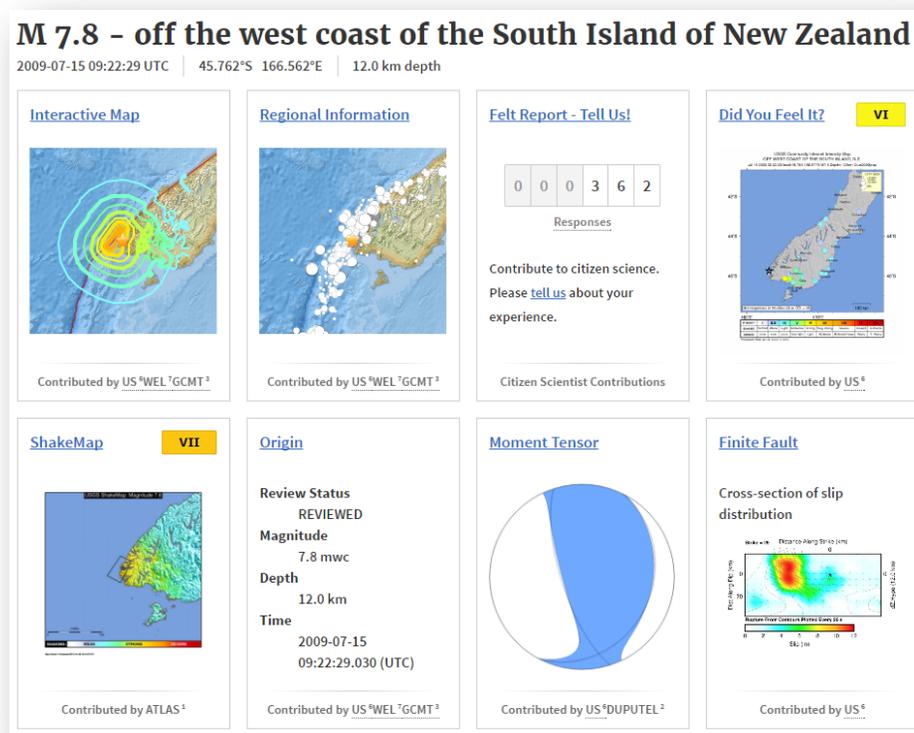
This opens a map that would need to be captured in the same way as the first example. This map shows historic seismicity for this region with the earthquake as a large yellow star.

3. Did You Feel It?

Click on this map and then click on the word "Downloads." This will create a list of files that can be downloaded for this earthquake. One that could work for you is the "DYFI City Map." Try downloading the JPG file. The "Intensity vs. Distance Plot" is an interesting plot that you might want to include in your report (not necessary).

4. Shakemap

Click on this map and then click on the word "Downloads." This will create a list of files that can be downloaded for this earthquake. One that could work for you is the "Intensity Map." Try the JPG file.



Step 2. Research the Regional Tectonics for your region

Search the internet for some plate tectonic maps and tectonic summaries for your region. Often, there are some USGS websites linked from the earthquake page that you used to get your earthquake map.

Step 3. Write the Paper

Write a paper that is font 12, double-spaced, with 1" margins. Include the figures and figure captions. Save the file with a name in this format (required to get a grade): GEOL_308_activity_06_lastname.docx (or pdf would be better). Include a list of references. Email the paper to your instructor prior to the beginning of class on 3/9/17.