

Quiz navigation

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Finish review

Started on	Sunday, September 4, 2022, 6:15 AM
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Completed on	Saturday, September 10, 2022, 9:30 AM
Time taken	6 days 3 hours
Marks	22.33/29.00
Grade	77.01 out of 100.00

Question 1

Correct

1.00 points out of 1.00

Flag question

The 6.3 magnitude L'Aquila earthquake on April 6, 2009 in central Italy killed over 300 people and was one of the worst earthquakes in the country in 30 years. However, this earthquake is more well known for the controversy surrounding it. Six scientists and one government official on the Italian National Commission for the Forecast and Prevention of Major Risks were accused of giving "inexact, incomplete and contradictory" information about the earthquake danger before the mainshock. These 7 people were convicted of manslaughter for downplaying the likelihood of a major earthquake six days before it took place, although the conviction was overturned upon appeal. You can read more about this earthquake and the controversy on the Wikipedia page:

https://en.wikipedia.org/wiki/2009_L%27Aquila_earthquake

Based on your reading of the website, you will note that there was a magnitude 4.1 earthquake that preceded the mainshock. We would now define this as a foreshock, but the problem in seismology is that this definition is applied afterwards, so it was unclear at the time if it would lead to a larger event. We will explore this in our assignment today. To help establish the situation, how many days before the mainshock did the magnitude 4.1 foreshock occur?

Answer: 7

Check

Correct

Marks for this submission: 1.00/1.00.

Question 2

Correct

1.00 points out of 1.00

Flag question

If nothing else, this tragedy highlights the importance of effective science communication. In this assignment, I would like you to practice creating a Jupyter notebook on your OpenSARlab (OSL) desktop that could help effectively communicate analysis of the central Italy seismicity leading up to the mainshock. A key selling point to Jupyter notebooks is that they are a "transparent" way to do the analysis - everyone can see your code and how you make your plots and hence what your conclusions are based on. People can even tweak your analysis to see how it would affect the outcome.

Let's start by creating a directory called jupyter in the home directory of your OSL desktop and then moving into this directory. From here you can start a new Jupyter notebook with the following command (remember case sensitive):

jupyter notebook

Run this command. You should then see a series of messages pop-up in the terminal, followed by URLs to access your jupyter notebook. Go ahead and copy-paste (or right-click and select Copy Link) one of these links into a browser window.

What happens when you open-up that link?

Select one:

☐ a. it does not bring up anything, it just gives an error

☐ b. it brings up a web browser that shows a list of several notebooks

☒ c. it brings up a web browser that shows a notebook list but it is empty

☐ d. it brings up an empty Jupyter notebook

☐ e. it brings up an example Jupyter notebook

Check

Correct

Marks for this submission: 1.00/1.00.

Question 3

Correct

1.00 points out of 1.00

Flag question

To get started with creating a new notebook, click on the New dropdown menu button on the right side and then choose iris. This should create a new tab in the browser with an empty notebook displayed. You should see the header with menu and toolbars, and a body with a single cell highlighted in blue. What is the default type that this first cell is set to by default?

Select one:

☐ a. markdown

☒ b. code input

☐ c. code output

☐ d. raw text

Correct. Go ahead and change this to Markdown by using the drop-down menu in the center of the header that currently says Code.

Check

Correct

Marks for this submission: 1.00/1.00.

Question 4

Correct

0.67 points out of 1.00

Flag question

Before going any further, let's take a look back at the original web browser tab that had the File list in it to see how it has changed. What is the name of the file it shows now?

Answer: Untitled.ipynb

Check

Correct

Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives 0.67/1.00.

Question 5

Correct

0.33 points out of 1.00

Flag question

The filename reminds us that we have not given our new notebook a name yet. On upper-left of the notebook editor, next to the jupyter logo, click on Untitled. You should then see a pop-up to change the name of the notebook. Give it a name like LAquila_Earthquake (I am avoiding the ' and space in the name because it is creating a file name from the title) and then click Rename. You can click back to the first browser tab to see that the notebook file has been renamed based on your title.

After making sure that the first cell is set to Markdown (see the answer to question 3 if you are not sure about this), you should click on the first cell to write some text to introduce what the purpose of this notebook is. What happens when you click inside the first cell and start typing?

Select one:

☐ a. a window pops up for you to enter text

☐ b. the line around it turns blue

☒ c. the line around it turns green

☐ d. the line around it turns grey

☐ e. nothing

Check

Correct

Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives 0.33/1.00.

Question 6

Correct

0.33 points out of 1.00

Flag question

I would like you to create a title on the first line of the notebook that says this: The 6.3 Magnitude L'Aquila Earthquake on April 6, 2009 in Central Italy

Then you can add a space and type some text about the earthquake similar to what I provided for you in the first question of this assignment. In order to see what the text in this cell will look like when you are not editing it, you need to click the Run button in the middle of the header toolbar. Which of the following happens when you click the Run button?

Select one or more:

☐ a. The `In []:` counter changes to `In [*]:` and then the `*` changes to a number.

☐ b. A new Raw text cell is created

☒ c. A new Code input cell is created

☐ d. A new Code output cell is created

☐ e. A new Markdown cell is created

☒ f. The font of the first Markdown cell changes

1 of 2 correct answers

Check

Correct

Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives 0.33/1.00.

Question 7

Correct

0.33 points out of 1.00

Flag question

The Markdown cells can be formatted in a variety of ways, but the most common is to use HTML code to accomplish this. I do not expect you to know HTML coding syntax, but since HTML webpages are so common, it is very easy to web search to learn how to format something with HTML code. For this notebook, I would like you to make the title line bold. Which of the following would allow you to change the font of the title line to be bold and larger than the rest of the text? In addition to checking on the web, you are welcome to figure this out by trying these in your Markdown cell and running them to see what is displayed.

Select one or more:

☐ a. <S>The 6.3 Magnitude L'Aquila Earthquake on April 6, 2009 in Central Italy</S>

☒ b. The 6.3 Magnitude L'Aquila Earthquake on April 6, 2009 in Central Italy ✓ 1 of 3 correct answers

☐ c. <bold>The 6.3 Magnitude L'Aquila Earthquake on April 6, 2009 in Central Italy</bold>

☒ d. The 6.3 Magnitude L'Aquila Earthquake on April 6, 2009 in Central Italy ✓ 1 of 3 correct answers

☒ e. The 6.3 Magnitude L'Aquila Earthquake on April 6, 2009 in Central Italy ✓ 1 of 3 correct answers

☐ f. <s>The 6.3 Magnitude L'Aquila Earthquake on April 6, 2009 in Central Italy</s>

Check

Correct

Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives 0.33/1.00.

Question 8

Correct

0.00 points out of 1.00

Flag question

It would also be good if you can add a figure to help illustrate what your research is focused on. In this case, a map that shows where the earthquake took place and a summary of its impact would be ideal. For this purpose, the USGS ShakeMap would be helpful, and you can see that a version of this is located on the Wikipedia website you were reviewing before. When you click on it, you can find information about how to link to this image from your notebook. However, this is an older earthquake so beware there can be some broken links once more than 10 years has gone by. Also, note that Wikipedia has links to information about images as well as the link to the actual image (which is what you need). You will also want to use a web search to see how to include an image with HTML code.

Based on this information, which of the following would successfully incorporate a ShakeMap image into your notebook?

Select one:

☐ a.

☐ b.

☐ c.

☒ d. ✓

Check

Correct

Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives 0.00/1.00.

Question 9

Correct

1.00 points out of 1.00

Flag question

If you haven't already, add the correct answer from the previous question to your Markdown cell.

Our goal with this notebook will be to plot the earthquakes before the magnitude 6.3 mainshock on April 6, 2009 to see whether there was an unusual pattern in the days leading up to the mainshock. In fact, it would be a good idea to add a Markdown cell to explain what the purpose of the code will be.

Then it is time to add a code cell to our notebook with some code in it to start our processing. We will use several libraries to download the earthquake catalog and plot the patterns over time. Most of these will be familiar from previous tutorials, but since we will be making plots with time on the x-axis, we will use the matplotlib.dates set of functions. You can read about that here:

https://matplotlib.org/3.3.0/api/dates_api.html

We will have time information in the traditional date-time format from our earthquake catalogs, so which function of the matplotlib.dates library would allow us to convert from date-time format to matplotlib's date number format?

Select one:

☐ a. num2date

☐ b. num2timedelta

☐ c. datetime

☐ d. get_epoch

☒ e. date2num ✓

☐ f. datestr2num

Check

Correct

Marks for this submission: 1.00/1.00.

Question 10

Correct

0.67 points out of 1.00

Flag question

To load the libraries we need, add these commands to your code cell:

```
import matplotlib.pyplot as plt
import matplotlib.dates as mdates
from obspy import UTCDateTime
from obspy.clients.fdsn import Client
client = Client("IRIS")
```

What happens when you click to run this code input cell?

Select one or more:

☐ a. The font of the first code cell changes

☐ b. A new Markdown cell is created

☒ c. The In []: counter changes to In [*]: and then the * changes to a number. ✓ 1 of 2 correct answers

☐ d. A new Code output cell is created

☒ e. A new Code input cell is created ✓ 1 of 2 correct answers

☐ f. A new Raw text cell is created

Check

Correct

Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives 0.67/1.00.

Question 11

Correct

0.67 points out of 1.00

Flag question

Go ahead and convert the new Code input cell to Markdown and then write some text to explain that the next set of code will set the variables for our earthquake catalog search. This text will be important for the notebook reader to recognize so perhaps you can add a bold title for this Markdown cell to be something like **SET SEARCH PARAMETERS HERE**.

We are going to use the client.get_events() function like we did when learning about ObsPy to retrieve an earthquake catalog for this region. We will need to specify the date-time range, the latitude and longitude of a circular radius search, and the minimum magnitude of our search. I would recommend you start with a date range that shows the ten years prior to the day of the earthquake. Which of these would accomplish this?

Select one or more:

☐ a. startt = mdates.date2num("1999-04-06")

☐ b. startt = mdates.date2num("April 4, 1999")

☒ c. endt = UTCDateTime("2009-04-06") ✓ 1 of 2 correct answers. Please add this to the Code cell in your Notebook.

☐ d. startt = UTCDateTime("April 4, 1999")

☐ e. endt = mdates.date2num("April 4, 2009")

☐ f. endt = UTCDateTime("April 4, 2009")

☐ g. endt = mdates.date2num("2009-04-06")

☒ h. startt = UTCDateTime("1999-04-06") ✓ 1 of 2 correct answers. Please add this to the Code cell in your Notebook.

Check

Correct

Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives 0.67/1.00.

Question 12

Correct

0.67 points out of 1.00





Flag question

Next we need to set variables for the location and magnitude information. I would recommend that you use the latitude and longitude of the earthquake from the Wikipedia page and search within about 100 km (or 1 degree) with magnitudes at or above 2.0. Which of the following would accomplish this?

Select one or more:

☐ a. maxrad = 100.0

☐ b. minmag = 1.9

- ☒ c. maxrad = 1.0  1 of 4 correct answers. Make sure to add this to the Code cell in your Notebook.
- ☒ d. minmag = 2.0  1 of 4 correct answers. Make sure to add this to the Code cell in your Notebook.
- ☒ e. lat = 42.3476  1 of 4 correct answers. Make sure to add this to the Code cell in your Notebook.
- ☐ f. lon = 42.3476
- ☐ g. lat = 13.3800
- ☒ h. lon = 13.3800  1 of 4 correct answers. Make sure to add this to the Code cell in your Notebook.

Check


Correct

Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives **0.67/1.00**.

Question 13

Correct


0.67 points out of 1.00

 Flag question

Click Run to set the variables and create a new cell. The next thing we will do is the catalog request, and it would be good to keep it separated from the variable setting code you have entered already. I would recommend that you change this new cell to a Markdown cell to describe the next step of the processing and to warn the reader that the catalog request can take a few minutes to complete if the number of events being requested is large.

Then click Run for the Markdown cell and it will add a new Code cell after it. For the processing that will be accomplished by this new Code cell, which of these would successfully retrieve the catalog?

Select one:

- ☐ a. client.get_events(starttime=starttt, endtime=endt, latitude=lat, longitude=lon, maxradius=maxrad, minmagnitude=minmag, catalog="ISC")
- ☐ b. cat = client.get_events(starttime=starttime, endtime=endtime, latitude=latitude, longitude=longitude, maxradius=maxradius, minmagnitude=minmagnitude, catalog="ISC")
- ☐ c. cat = get_events(starttime=starttime, endtime=endtime, latitude=latitude, longitude=longitude, maxradius=maxradius, minmagnitude=minmagnitude, catalog="ISC")
- ☐ d. get_events(starttime=starttt, endtime=endt, latitude=lat, longitude=lon, maxradius=maxrad, minmagnitude=minmag, catalog="ISC")
- ☐ e. get_events(starttime=starttime, endtime=endtime, latitude=latitude, longitude=longitude, maxradius=maxradius, minmagnitude=minmagnitude, catalog="ISC")
- ☒ f. cat = client.get_events(starttime=starttt, endtime=endt, latitude=lat, longitude=lon, maxradius=maxrad, minmagnitude=minmag, catalog="ISC") 
- ☐ g. client.get_events(starttime=starttime, endtime=endtime, latitude=latitude, longitude=longitude, maxradius=maxradius, minmagnitude=minmagnitude, catalog="ISC")
- ☐ h. cat = get_events(starttime=starttt, endtime=endt, latitude=lat, longitude=lon, maxradius=maxrad, minmagnitude=minmag, catalog="ISC")

Check


Correct

Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives **0.67/1.00**.

Question 14

Correct

0.67 points out of 1.00

 Flag question

After the catalog request is complete, use the new Code cell that was created to enter a `print(cat)` command. This will get some basic information about the catalog you retrieved. Run this simple Code cell after you have added the command. How many events are in the catalog?

Answer: 

Check


Correct

Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives **0.67/1.00**.

Question 15

Correct

1.00 points out of 1.00

 Flag question

The next part of the processing will be to create a pair of lists (1 column arrays) that will contain the origin time and the event magnitudes. This will be a little different than we have done in the past, so I would recommend that you create a Markdown cell before the next code to explain what it is doing.

The code will create two list objects called **times** and **mags**, initiating them as empty lists with the `[]` symbols. Then it will perform a loop to go through each event in the catalog (`cat`) you created with `client.get_events()`. Recall that the catalog object in ObsPy is composed of event objects, so this loop formally calls each one by the name `event`. Then during the loop the origin times and magnitudes are called from each event object with the `event.origins[0].time.datetime` and `event.magnitudes[0].mag` attributions, respectively. I would not be surprised if this is confusing, so you may want to refer to the description of the Catalog object at the following link to be reminded of how a catalog contains a set of events, which each contain origins (`origin[0]` refers to the first origin time), which contain a time, which can be specified in datetime format:


<https://docs.obspy.org/packages/obspy.core.html#event-metadata>

Lastly, the `times.append` syntax indicates that the time called from the event object is then appended to the `times[]` list. In essence, this loop is taking the times and magnitudes from the catalog object and storing them in separate lists. The list structure will allow them to be modified (necessary for the times) and sent to matplotlib for plotting. Plenty to explain, right? Make sure to describe this in the Markdown cell. Then these are the commands that should go in the following Code cell:

```
times = []
mags = []
for event in cat:
    times.append(event.origins[0].time.datetime)
    mags.append(event.magnitudes[0].mag)
```

To help make sure you understand what is going on with this code, why do the commands in the loop not require a format like `cat.event.attribute[0]` instead of just `event.attribute[0]`?

Select one:

- ☐ a. The for loop allows all of the event objects to be modified at the same time.
- ☐ b. When a catalog object is created, the event attribute is available to be used.
- ☒ c. The loop assigns the information from each earthquake in the catalog to the event variable. 
- ☐ d. The `get_events()` function automatically stores values in an event structure.

Check


Correct

Marks for this submission: 1.00/1.00.

Question 16


Correct

1.00 points out of 1.00

 Flag question

Which of the following commands would spot check what the time and magnitude information for the fifth event in the catalog?

Select one:

- ☐ a. print times[:5], mags[:5]
- ☐ b. print times[:4], mags[:4]
- ☐ c. print (times[:4],mags[:4])
- ☐ d. print (times[5],mags[5])
- ☐ e. print times[5], mags[5]
- ☒ f. print (times[4],mags[4])  Correct. Go ahead and add this to the end of the Code cell, but make sure not to indent it! It is not part of the loop, so it needs to be executed after the loop is done.
- ☐ g. print times[4], mags[4]
- ☐ h. print (times[:5],mags[:5])

Check


Correct

Marks for this submission: 1.00/1.00.

Question 17


Correct

1.00 points out of 1.00

 Flag question

When you run the Code cell with the loop and print commands, what is the output?

Select one:

- ☐ a. 2009-04-03 05:10:35.400000 2.0
- ☐ b. 2009-04-05 22:39:42.840000 3.3
- ☒ c. 2009-04-03 05:48:03.500000 2.1 
- ☐ d. 2009-04-05 22:56:43.890000 2.3

Check

Correct

Marks for this submission: 1.00/1.00.

Question 18

Correct

0.00 points out of 1.00

As was mentioned previously, the times list will need to be modified, because it is in the datetime format. In order to plot it on the x-axis in matplotlib, it helps to convert it to a matplotlib number format. Recalling what was the correct function for this from question 9, which of the following would create a new list called mtimes for these matplotlib times?

Select one:

Flag question

- ☐ a. mtimes = date2num.times
- ☐ b. mtimes = datetime2num(times)
- ☐ c. mtimes = mdates.datetime2num(times)
- ☐ d. mtimes = mdates.datetime2num.times
- ☐ e. mtimes = datetime2num.times
- ☒ f. mtimes = mdates.date2num(times) ✓ Correct, please add this to the Code cell right after the loop command, but make sure there is no indenting before it.
- ☐ g. mtimes = date2num(times)
- ☐ h. mtimes = mdates.date2num.times

Check

Correct

Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives **0.00/1.00**.

Question 19

Correct

1.00 points out of 1.00

Flag question

To see how the mtimes values are different from the times values, add another print command to spot check the mtimes and mags values for the fifth event in the catalog. What does it produce when you run it?

Select one:

- ☐ a. 14339.944 3.3
- ☐ b. 733500.242 2.1
- ☐ c. 14339.956 2.3
- ☒ d. 14337.242 2.1 ✓
- ☐ e. 14337.216 2.0

Check

Correct

Marks for this submission: 1.00/1.00.

Question 20

Correct

1.00 points out of 1.00

Flag question

The next section of code will create a plot, so this would be another good time to add a Markdown cell and explain what the plot is supposed to show first. We are going to make a plot that shows the magnitude of all earthquakes in the catalog over time. The code will initiate the plot with the first command like this:

```
fig1 = plt.subplots(1,1)
```

Note that we have not typically done this step because it is not necessary when you are making only one plot, which has been the case for our previous tutorials. The code uses the subplot() function to help with this, but it still indicates that only 1 plot will be made so it will fill the whole plot window. Then we will use the plot_date() function that you can read about here:

https://matplotlib.org/3.3.0/api/_as_gen/matplotlib.pyplot.plot_date.html?highlight=pyplot%20plot_date

Which of the following would plot the magnitudes over time using a point symbol?

Select one:

- ☐ a. plot_date(mtimes,mags,'o')
- ☐ b. plot_date(times,mags,marker='o')
- ☒ c. plt.plot_date(mtimes,mags,marker='.') ✓ Correct. Make sure to add this to the Code cell. You might get a warning, but don't worry about it.
- ☐ d. plt.plot_date(times,mags, '.')
- ☐ e. plot_date(times,mags, '.')
- ☐ f. plt.plot_date(mtimes,mags,'o')
- ☐ g. plt.plot_date(times,mags,marker='o')
- ☐ h. plot_date(mtimes,mags,marker='.')
- ☐ i. plt.plot_date(mtimes,mags, '.')

Check

Correct

Marks for this submission: 1.00/1.00.

Question 21

Correct

1.00 points out of 1.00

Flag question

What is the correct command to make the plot viewable? If you are unsure, you may want to take a moment to review the matplotlib resources on the pyplot library.

Answer: `plt.show()` ✓

Check

Correct. Add this line to the end of your Code cell.

Correct

Marks for this submission: 1.00/1.00.

Question 22

Correct

1.00 points out of 1.00

Flag question

Go ahead and run the matplotlib Code cell if you have not already done so. What happens when you run it?

NOTE: You might get a warning right above what you should get, but don't worry about that!

Select one:

- ☒ a. A plot appears right beneath the Code cell ✓ Hooray!
- ☐ b. A plot appears in a pop-up window
- ☐ c. Nothing except an error message
- ☐ d. Nothing

Check

Correct

Marks for this submission: 1.00/1.00.

Question 23

Correct

0.67 points out of 1.00

Flag question

Take a moment to review the plot. Then switch the new cell after the plot to a Markdown cell and describe what you see in the plot. In particular, you should seek to answer this question: Is there any indication in this plot that the pattern in magnitudes of seismicity was different right before the magnitude 6.3 than it was during the previous 10 years? This question is asking you to evaluate whether there was any large magnitude (M>6) earthquakes that had a similar pattern prior to them as that before the April 6, 2009 earthquake. You should also look for whether there was a different pattern right before the 2009 earthquake that was not observed over that 10 years prior.

Select one:

- ☐ a. The magnitudes of earthquakes appear to be increasing at a slower rate than usual in the weeks before the 2009 earthquake.
- ☐ b. The magnitudes of earthquakes appear to be decreasing at a faster rate than usual in the weeks before the 2009 earthquake.
- ☐ c. The magnitudes of earthquakes appear to be decreasing at a slower rate than usual in the weeks before the 2009 earthquake.
- ☐ d. The magnitudes of earthquakes appear to be smaller in the weeks before the 2009 earthquake.
- ☐ e. The magnitudes of earthquakes appear to be larger in the weeks before the 2009 earthquake.
- ☐ f. The magnitudes of earthquakes appear to be increasing at a faster rate than usual in the weeks before the 2009 earthquake.
- ☒ g. The magnitudes of earthquakes does not appear to be unusual in the weeks before the 2009 earthquake. ✓

Check

Correct

Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives **0.67/1.00**.

Question 24

Correct

0.67 points out of 1.00

Flag question

Based on the findings you hopefully described in the Markdown cell, it would make sense to also investigate whether the seismicity rate changed in the days leading up to the 2009 earthquake. I would suggest creating a second Markdown cell to describe that this will be the purpose of the next set of code. This code will start with a line to initiate the plot, but it will be slightly different to define both a figure and the axes. Start your Code cell with this:

```
fig2, axes = plt.subplots(1,1)
```

The axes object helps to define more specific details of a plot. And in this case, it will allow us to create a histogram using the datetime information stored in the mtimes list. You can read more about the axes.hist() function here:

https://matplotlib.org/3.3.0/api/_as_gen/matplotlib.axes.Axes.hist.html

We should plot the histogram separated into a bin for each month. Which of the following commands would accomplish this?

Select one:

- ☐ a. axes.hist(mtimes, bins=12)
- ☐ b. axes.hist(times, bins=120)
- ☐ c. hist(mtimes, bins=12)
- ☒ d. axes.hist(mtimes, bins=120) ✓ Correct. Make sure to add this to your Code cell.
- ☐ e. hist(mtimes, bins=120)
- ☐ f. axes.hist(times, bins=12)

Check

Correct

Marks for this submission: 1.00/1.00. Accounting for previous tries, this gives 0.67/1.00.

Question 25

Correct

1.00 points out of 1.00

Flag question

Since we have defined the plot using the axes structure this time, we will have to describe how it will show time on the X-axis. This will be accomplished using these two commands that you should add to your Code cell:

```
axes.xaxis.set_major_locator(mdates.YearLocator())
axes.xaxis.set_major_formatter(mdates.DateFormatter('%Y'))
```

Once again, what is the correct command to make this plot viewable in the notebook?

Answer: plt.show() ✓

Check

Correct. Add this line to the end of your Code cell.

Correct

Marks for this submission: 1.00/1.00.

Question 26

Correct

1.00 points out of 1.00

Flag question

Take a moment to review the plot. Then switch the new cell after the plot to a Markdown cell and describe what you see in the plot. In particular, you should seek to answer this question: Is there any indication in this plot that the pattern of seismicity rate was different right before the magnitude 6.3 than it was during the previous 10 years? This question is asking you to evaluate whether there were any large magnitude earthquakes that had a similar changes in seismicity rate prior to them as that before the April 6, 2009 earthquake. You should also look for whether there was a different pattern right before the 2009 earthquake that was not observed over that 10 years prior.

Select one:

- ☐ a. The seismicity rate was lower right before the 2009 earthquake than it had been at any point within the prior 10 years.
- ☐ b. The seismicity rate was higher right before the 2009 earthquake than it had been at any point within the prior 10 years.
- ☒ c. The seismicity rate was high right before the 2009 earthquake, but it has been higher within the prior 10 years without producing a M>6 earthquake. ✓
- ☐ d. The seismicity rate right before the 2009 earthquake did not look any different than it had been in the prior months and years.
- ☐ e. The seismicity rate was low right before the 2009 earthquake, but it has been lower within the prior 10 years without producing a M>6 earthquake.

Check

Correct

Marks for this submission: 1.00/1.00.

Question 27

Correct

1.00 points out of 1.00

Flag question

Congratulations, you have created a useful Jupyter Notebook! You could put this file out on the internet and other people could download it and use it to examine your findings.

For the last part of the assignment, I would like you to take on the role of another scientist who finds your notebook, but they want to apply it to a different region of the world. Go ahead and edit the latitude and longitude values at the beginning of your Jupyter notebook to focus on a region of the world you are interested in. If you can, try to maintain the same search radius to make it easier to compare the rates from our original location with the one you choose. Re-run each of the code cells after the cell that sets the variables to retrieve the catalog for this region and then calculate the seismicity rates and plot them.

How does the seismicity rate in the region you chose differ from the region we started with? For example, is the overall rate higher or lower? Does it have a different pattern over time?

Answer: It was almost different than this region. ✓

Check

Correct

Marks for this submission: 1.00/1.00.

Question 28

Correct

1.00 points out of 1.00

Flag question

How are the magnitude ranges similar or different?

Answer: Magnitude range is lower than this. Most earthquakes were in between 2-4 M ✓

Check

Correct

Marks for this submission: 1.00/1.00.

Question 29

Correct

1.00 points out of 1.00

Flag question

Why do you think the seismicity rate is different in the region you chose compared to the region we started with? In other words, what do you think is causing the difference?

NOTE: When you're all done with the jupyter notebook, hit the **Save** icon in the upper-left of the notebook editor to save it. Then, switch to the terminal window you used to open the notebook and hit **Ctrl + c**, followed by **y** if prompted. That should shut down your notebook!

Answer: Area of interest is away from any of the seismicity source. ✓

Check

Correct

Marks for this submission: 1.00/1.00.

Finish review

You are logged in as Dilshad Raza (Log out)

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