# LAB 4 – Sea Floor Changes in a Volcanically Active Setting

# Name: Section number \_\_\_\_\_\_\_\_\_\_\_\_\_

Complete the lab and use this form as your answer sheet. Type answers in the Text boxes which will expand as you type in them.

# Lab 4.0 Introduction

1. In Figure 4.0.2, review where all the devices are located around Axial seamount. How many stations are set up, where are they relative to the caldera, and what kind of data will be collected from them?

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# Lab 4.1 - Sea Floor Changes in a Volcanically Active Setting

***Orientation Questions***

1. Axial Seamount is located at the southeast end of the Cobb-Eickelberg Seamount Chain. Several of the seamounts in the chain are pinned in the above map.  Zoom in on the map and describe how Axial Seamount compares to other seamounts in the chain with regards to shape, size, width (using the line measure in upper left corner of map), ruggedness, etc.

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1. Now convert both the depth of the top of the seamount and the depth of the base of the seamount from meters to feet and subtract the difference (hint: it should be close to your answer to the first quick check question). Show your math.

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1. Let’s now review metric measurement conversions.  Distance is measured in various scales of meters.  You will look at meters converted to kilometers here.  1 km = 1000 m.  Convert the height of the seamount, 1100 m, to km.  Then convert it to miles using 1 mi = 1.61 km.

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1. The volume of water at each depth in the water column exerts pressure downwards; the deeper the water column, the greater the pressure. Water pressure increases about 15 psi (pound-force per square inch) for every 10 meters (33 feet) of depth. From a data point in the graph, what calculation can you run that would enable you to convert pressure to depth? Select a point on the water pressure curve and calculate the depth from the information provided here.

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***Interpretation Questions***

1. What do you think might cause the variations in pressure you notice in the plot? Record your best guess first, then click below to read an explanation

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1. What challenges might the phenomenon described above present for oceanographers when they want to study average water depth at this site?

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1. Describe the patterns in the depth data. Be sure you zoom in and out of the data to notice small and large changes.  (Note, sometimes the y-axis on this graph will flip when zooming out. To reset it, click the "All Data" button.)

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1. What do you think may have caused the changes you described? Formulate some preliminary ideas in this step to discuss with classmates in class or in a discussion board; you will revisit this question in the next activity.

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1. Adjust the widget to zoom in to the day before and after the major change in depth. How much depth change occurred and how long did it take for the change to take place?
2. Describe the pattern(s) you see in the depth plot; be as thorough as you can.
3. Describe the pattern(s) you see in the depth plot; be as thorough as you can.

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1. If you are continuing to Lab 4.2, before you proceed, consider what the graphed line might be revealing about changes to the seafloor over time and record your ideas. Remember, this is a volcano; what do you think might be happening beneath the surface that could cause the depth of the seafloor to change?

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# Lab 4.2 - Don’t volcanoes erupt up?

***Interpretation Questions:***

1. Describe the patterns in each and compare patterns in both graphs and to the water depth plot.

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1. Considering the combination of seafloor depth and earthquake data, what are some possible causes for events that occurred on or about April 24, 2015?  Consider changes in seafloor depth as well as the difference between the number of earthquakes before and after the April 24 event?  Think about what might be occurring beneath the surface of the volcano.  Record your ideas and revisit them for next steps.

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1. What happened to seafloor depth prior to the April 2015 event in this longer time scale graph? (Describe patterns in the data over time)

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1. After discussing, write your own explanation for the trends and patterns in the sea floor depth data for the April 24, 2015 event.  Be sure to include quantitative evidence from the data set as well as important science concepts introduced in this lab and/or your course material.

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# Lab 4.3 - Applying your knowledge to an actual eruption

***Interpretation Questions:***

1. Re-watch the following underwater eruption video used in the introduction to this lab and record the volcanic activity you observe.

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### *Application Questions:*

1. Hypothesize, with thorough explanations, what you think could be occurring to the seafloor bathymetry as well as below the seafloor based on what you learned from Lab 4.1 and Lab 4.2.

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1. Following discussions about the above two questions, compose your own explanation for your hypothesis that includes evidence from Activities 1 & 2 and key scientific ideas.

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### *Reflection Question:*

1. What questions do you still have about what drives changes in the seismicity and/or bathymetry over time at Axial Seamount?

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