

PROJECT #3

Plate Tectonics and Geologic Hazards

Background

1. What are the three types of tectonic plate boundaries? For each type, name a place or region where that type of boundary occurs.

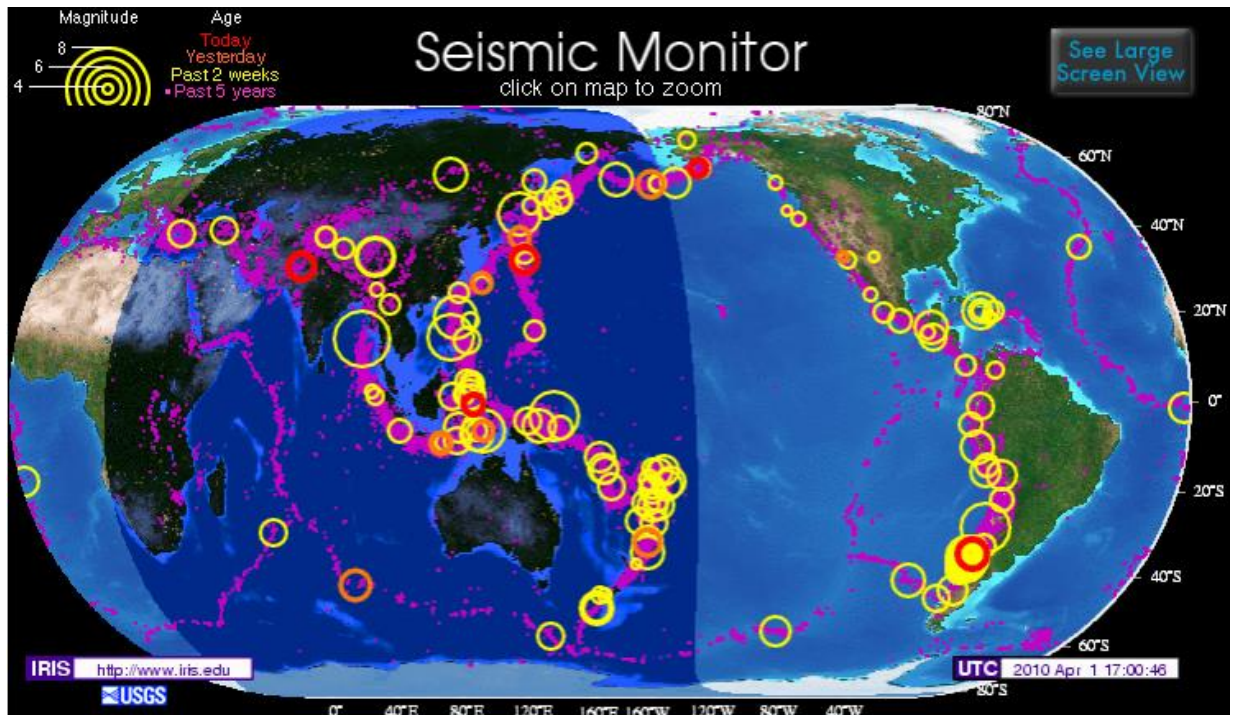
Divergent Boundaries exist along the edge of the North American Plate and the Eurasian Plate due to plate separation. Convergent Boundaries are the opposite caused by plates shifting towards each other near mountain and coasts. Fault Boundaries are when the plates slide against each other such as the San Andrea's fault which runs thru California.

2. What are the three geologic settings that produce volcanoes? Name an example of each setting. How are these settings related to the three types of plate boundaries (which settings are and are not located along plate boundaries, and which types of boundaries have and do not have volcanic activity)?

Volcanoes are located near convergent plate boundaries, sometimes divergent plate boundaries, and 'hotspots' like Hawaii. The first two settings are related to boundaries in that they create cracks in the earth's crust for molten lava to escape. Hotspots are located in areas where lava below the crust just happens to be close enough to the crust and under enough pressure to make its own way out.

Current earthquake activity

3. Insert the current global Seismic Monitor map below. Add a caption that explains the map's symbology (i.e., how to interpret the symbols on the map).



Questions 4 & 5 concern the earthquake you have identified as the largest earthquake in the past two days

4. List the location (lat/long and region) of the epicenter, the depth of the focus, the magnitude, and the date / time of the earthquake.

Andaman Islands, India 13.62N 92.86E. Depth : 45.4 km. Magnitude: 6.6. March 30th 2010 16:54:48

5. Is this earthquake along a tectonic plate boundary? If so, which plates collide there, and what kind of boundary is it? If not, why is an earthquake occurring in the middle of a tectonic plate?

This earthquake occurred along the India and Australian tectonic plates, these are convergent boundaries.

Current volcanic activity

6. How many volcanoes are currently active around the world? Where are they located?

There are 13 active, located Iceland, Hawaii, Indonesia, Russia, Japan, Chile and Guatemala.

Questions 7-9 concern the currently active volcano you have selected

7. Which volcano did you select? Where is it located?

Mauna Loa is located in the Hawaiian Islands, USA.

8. What is the nature of the current activity of the volcano? How long has this activity been occurring?

There is current activity this month, last reported was 2002-2005, and before that most of its activity was from a 750 year long activity time period which occurred no longer than 1500 years ago.

9. Has the volcano erupted previously in historical time? What kinds of eruptions have these been (review textbook for the different types of eruptions)?

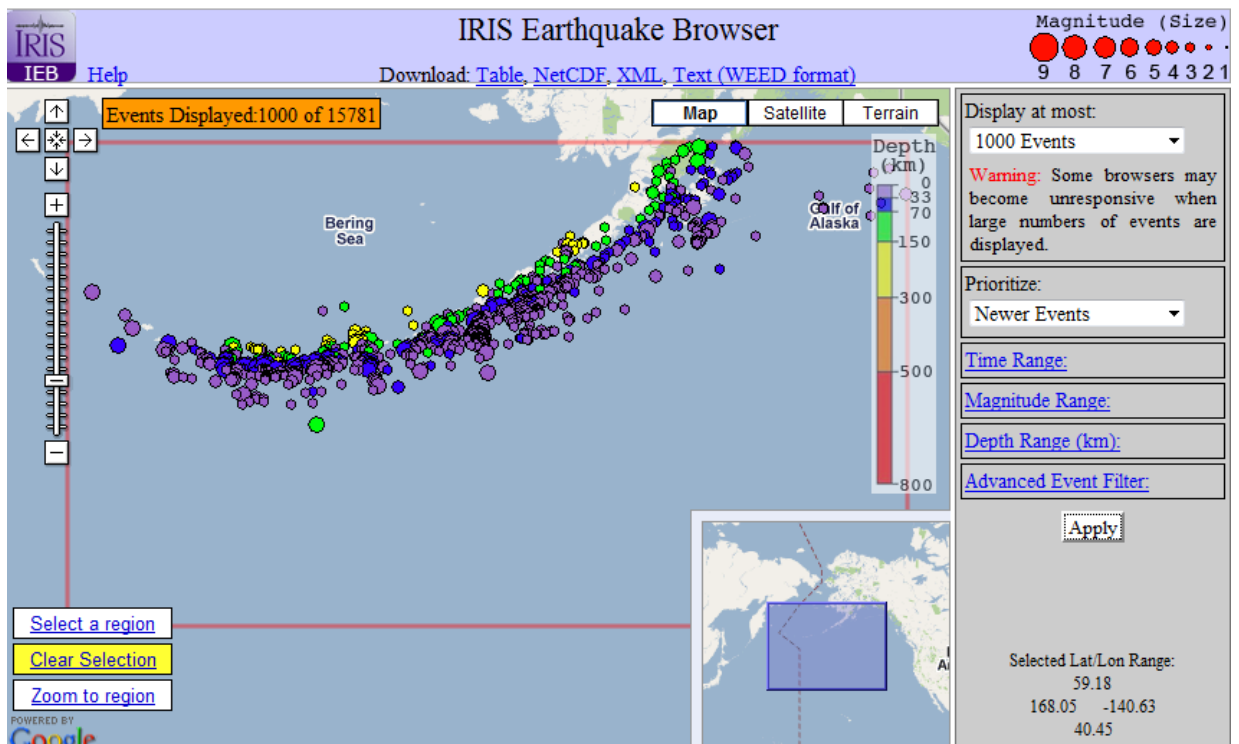
Other than when it was created it has been active from 2002-2005, and again in march 2010. This is a Hawaiian eruption, caused by slow leaking lava

10. What type of volcano is it (review the textbook for major types)? In which of the three geologic settings is the volcano situated? Which plate(s) are involved in the geologic context for this volcano?

This is a Shield Volcano which is common among other hotspot locations located on the Pacific Plate.

Earthquakes and volcanoes of subduction zones

11. Insert a screenshot of your region from the earthquake browser. Describe the location of your region and list the lat/long coordinates of the corners of your region.



West Coast USA. 37 -120

12. Which tectonic plates converge here?

The Pacific Plate and the North American Plate

13. Describe the pattern you see on the map, both in the locations of earthquakes and in the depths of the earthquakes.

The Deeper earthquakes are located towards the north (yellow/green dots) with the blue separating almost all of the purple (closer to the surface quakes)

14. Based on the locations of earthquakes at different depths, can you determine the direction of subduction (i.e., which plate is being subducted under the other plate)? What is the direction? How can you tell?

If the earthquakes are happening closer to the surface on the pacific plate side that would be where initial contact occurs, and then the deeper ones being UNDER the north American plate would mean the Pacific plate is being subducted.

15. On average, how many earthquakes greater than magnitude 4 occur in your region each year? How many earthquakes with magnitude greater than 5? Greater than 6? Greater than 7? For each figure, explain your calculation.

By applying a filter to look at only earthquakes for 2006-2009 and dividing by 4, there were 301 greater than 4, 53 greater than 5, 6 greater than 6 and 1 greater than 7.

16. In general terms, what is the relationship between frequency and magnitude in your region?

There are more frequent small earthquakes than large ones.

17. On average, how many earthquakes occur less than 33 km deep in the crust each year in your region? Between 33-150 km? Below 150 km?

About 156 are within 33km. 126 between 33-150km, and 14 reported being below 150 km.

18. What is the relationship between depth and frequency in your region?

These earthquakes happen pretty evenly from 0-150 km, with slightly more under 33km from the surface, very few further than 150km.

19. Is there any relationship between depth and magnitude in your region (i.e., are deeper earthquakes likely to be larger, smaller, or the same as shallower earthquakes)?

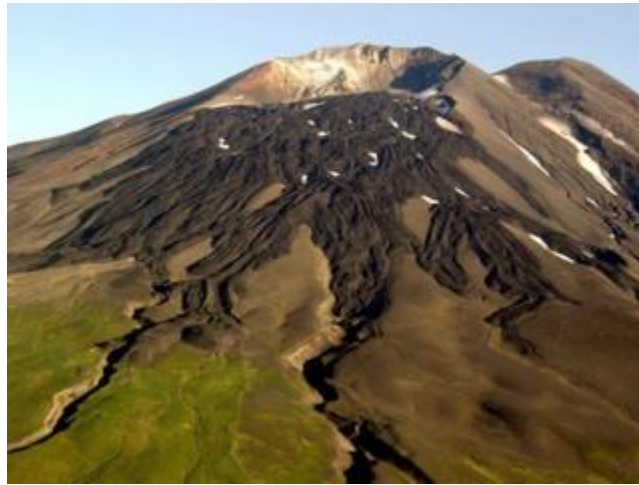
The largest earthquakes (6+) are located at less than 33km but there are still a small amount that occur at up to 300km.

Questions 20-24 relate to the volcano you have selected using Google Earth

20. Which volcano did you select? Where is it located?

Gareloi is located in the Aleutian Islands.

21. Insert a photo of the volcano and a map showing your volcano's location.



22. What kind of volcano is it? What types of eruptions does this type of volcano have? How has the appearance of the volcano been shaped by these eruptions?

This is a Dome Volcano and has Pelean eruptions. This causes the ash to build up more so on one side and the lava to flow down the other creating an uneven cone shape.

23. Has the volcano erupted in historical time? What kinds of eruptions have these been?

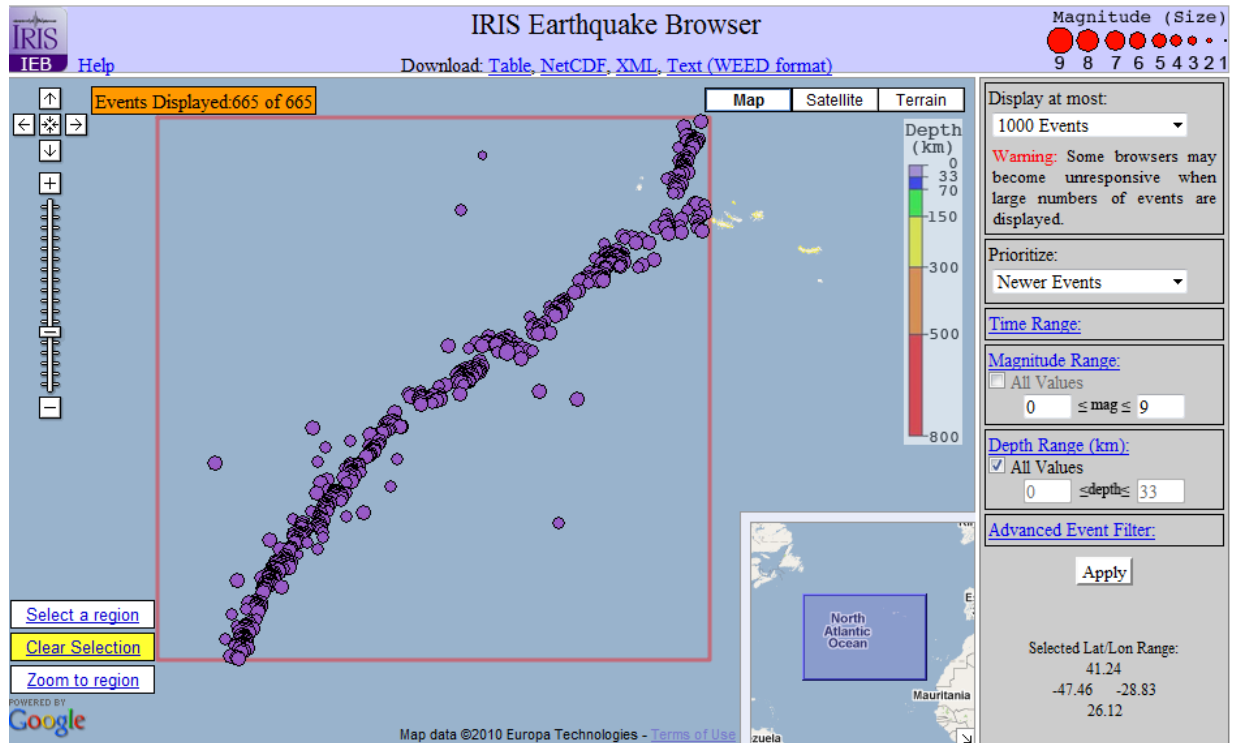
Was formed in 1929 by a Phreatic eruption initially.

24. Have any of these eruptions impacted humans in the area? Describe these impacts, including both the specific cause and the damage done.

No, this was formed in the ocean in string of Islands which people do not live on.

Earthquakes and volcanoes of divergent plate boundaries

25. Insert a screenshot of your region from the earthquake browser. Describe the location of your region and list the lat/long coordinates of the corners of your region.



North Atlantic ocean 33 -28

26. Which tectonic plates are diverging here?

The north American plate and the African Plate

27. Describe the pattern in the locations of the earthquakes you see on the map.

Almost all close together in a thin strip.

28. How do the depths of earthquakes in this region compare to those in the subduction zone?

These all seem to be within 33 km of the surface.

29. On average, how many earthquakes occur in your region each year? How many earthquakes with magnitude greater than 5? Greater than 6? Greater than 7?

About 51 earthquakes a year, 8 greater than 5, and 0 greater than 6 or 7.

30. In general terms, what is the relationship between frequency and magnitude in this region?

They're mostly all smaller than a 5.

31. On average, how many earthquakes occur less than 33 km deep in the crust each year in your region? Between 33-150 km? Below 150 km?

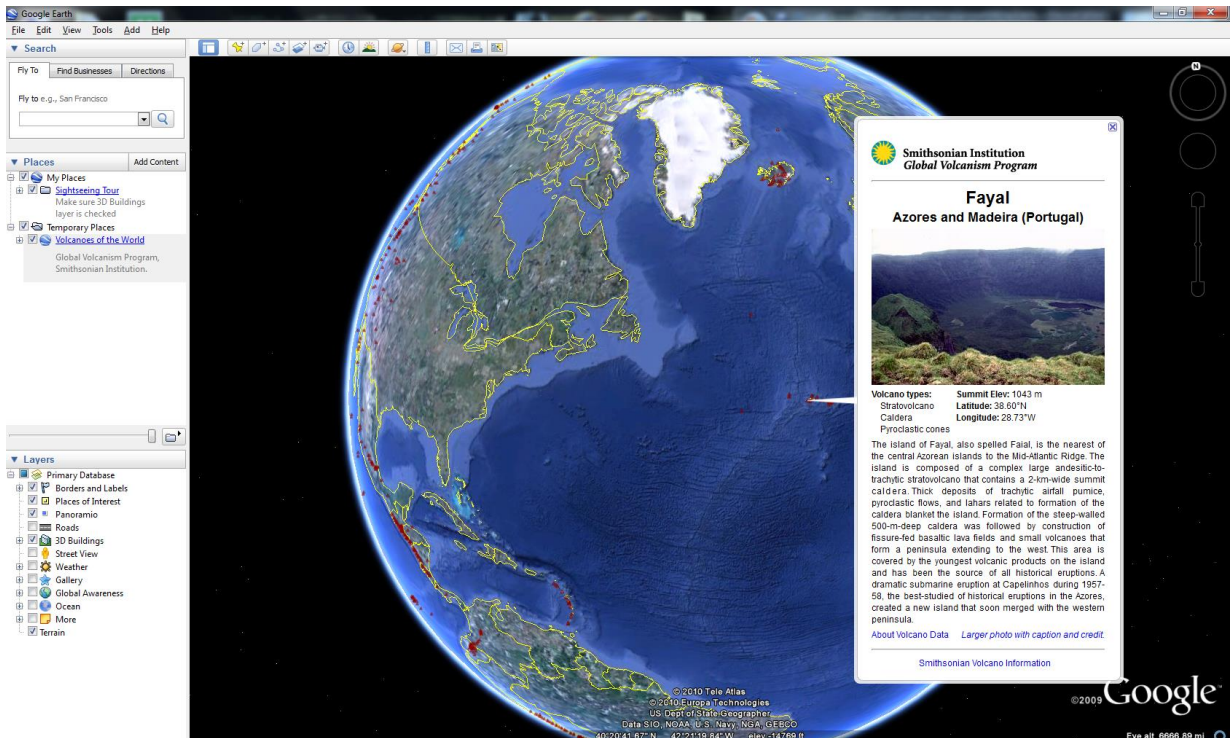
About 51 earthquakes per year, all withink 33km.

Questions 32-36 relate to the volcano you have selected using Google Earth

32. Which volcano did you select? Where is it located?

Fayal is located in Azores and Maderia (Portugal)

33. Insert a map showing your volcano and a photo of the volcano.





34. What kind of volcano is it? What types of eruptions does this type of volcano have? How has the appearance of the volcano been shaped by these eruptions?

This is a Cinder Cone volcano. It has strombolian eruptions now that it is above the waters surface. These eruptions have cause what looks like a crater at the top.

35. Has the volcano erupted in historical time? What kinds of eruptions have these been?

It was created in the 1600s and has erupted once in 1958. Both having central vent explosions with lava flow and the second one formed the island.

36. Have any of these eruptions impacted humans in the area? Describe these impacts, including both the specific cause and the damage done.

The last explosion is listed to have caused an evacuation as well as property damage,

Comparison and critical assessment

37. What are the differences in earthquake activity (frequency, magnitude, and depth) between your two regions?

Convergent zones see stronger, more frequent earthquakes at a larger depth range than divergent. The pictures are a clear indication as well as the average numbers acquired.

38. What are the differences in volcanic activity (frequency of eruptions, types of eruptions, hazards, and between your two regions?)

The areas of convergence had much more frequent eruptions with multiple records on the website. As for types, they seemed to be more violent in convergent zones. Both regions were in the ocean, so I'm not sure on the effects on civilization.

39. How do the geologic differences between divergent boundaries and subduction zones account for the differences you have reported in #37 and #38?

Convergent zones will have more drastic earthquakes and volcanoes due to the collision rather than the separation of plates. Collision creates pressure and that's a main ingredient in both. Divergent zones create gaps, where pressure can be released so there are still volcanoes, just not as severe, the same goes for earthquakes.

40. What limitations or sources of error are present in the data you used for this project? What are some ways these limitations may have impacted your conclusions?

The region I selected may not have been the best example, not everything goes by the books either. Averages were used; this leaves out extremes in both scenarios. The averages though however are what conclusions are based on and are good summaries for the respective areas.